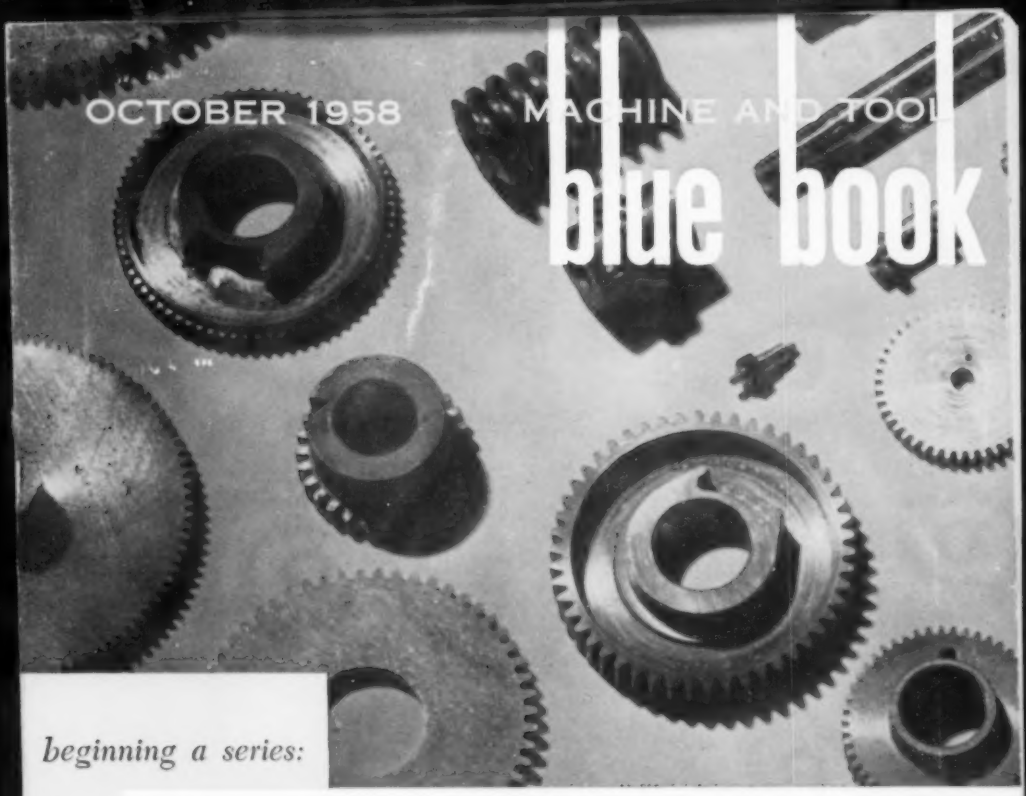


OCTOBER 1958 MACHINE AND TOOL

blue book

beginning a series:

Fundamentals of Fine Pitch Gear Design and Production see page 99

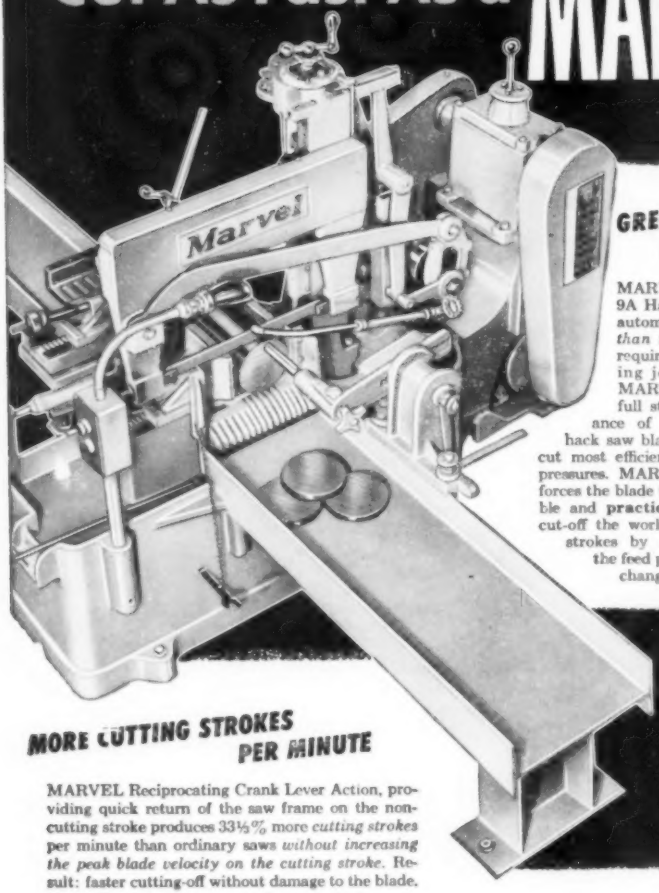
also:

Cutter Cooling in Russia see page 104

Fabulous Results from Gun Drilling see page 112

a hitchcock publication

How Can Any Hack Saw Cut As Fast As a MARVEL?



GREATER EFFECTIVE FEED PRESSURE

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying *more than twice the feed pressure* required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and **practical** on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

MORE CUTTING STROKES PER MINUTE

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces 33⅓% more *cutting strokes* per minute than ordinary saws *without increasing the peak blade velocity on the cutting stroke*. Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

Write for the MARVEL Catalog and the complete story on MARVEL Metal Cutting Saws



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P3-1301

MARVEL Metal Cutting SAWS
Better Machines—Better Blades

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO for Better Values

WHEEL EDGES TELL THE STORY!

NORMAL · *The right abrasive cutting wheel, properly applied, produces edges like these:*



Slightly rounded edge is a sign of the right wheel properly applied to the cutting of solid bar stock up to 12 inches square. You'll get fast cutting and long wheel-life with the right abrasive cutting wheel.



A wheel which retains its **square edge** is well-suited to cutting both—solids, and structurals or tubing of medium wall thickness. A good general-purpose wheel is required for these mixed cutting operations.



This **edge** is **slightly concave.** It should appear this way when you've used the right wheel to cut light tubing or other thin-wall sections. ALLISON wheels designed for this application make burr negligible.

ABNORMAL · *The wrong wheel, or improper application, produces edges like these:*



A **slightly pointed edge** means a wheel mismatched to the cutting job. A wheel which looks like this is too hard, doesn't break down uniformly. The tapering effect can produce wheel binding and breakage, and can burn the cut.



A "**chisel**" **edge** shows uneven wear, faster breakdown of the wheel on one side than on the other. It's the result of improper application of coolant in wet cutting. The result—shorter wheel life, and crooked cuts.



When the abrasive grain on the wheel edge wears smooth without being torn out, the **edge** becomes "**glazed,**" and the wheel loses its cutting efficiency. This condition is easily avoided by proper wheel application.

Abrasive Cutting Can Give You CLEANER Cuts—Faster

Cutting speeds of a few seconds per square inch, on almost *any* material, mean substantial time savings. Even titanium can be cut quickly and economically with the right abrasive cutting machine and wheel.

Fine finish obtained from abrasive cutting avoids burn, minimizes burr, and reduces or eliminates additional finishing operations.

Accuracy of CAMPBELL machines permits cutting within the closest tolerances, reduces rejects and scrap loss.

A complete selection of machines and wheels for *any* cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14" rounds . . billets up to 12" square . plate up to 6" thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond —3" to 34" diameters—.006" to 3/16" thick.

Application help is available from your ALLISON-CAMPBELL Field Engineer. His know-how is your assurance of the efficient, accurate, and economical cutting you can expect from modern abrasive cutting techniques. Call on him for expert advice.

WRITE FOR NEW BULLETIN

ALLISON-CAMPBELL Division has a modern, fully equipped Demonstration Laboratory in which your own cutting problems can be analyzed. Write for a copy of DH-20, a new bulletin describing these services. Details on ALLISON Abrasive Cutting Wheels and CAMPBELL Machines are also available.

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CONTROL CENTER Ease of operation is one of the principal reasons for using any hand turret lathe. The Wade "Model 94" shown here performs more quickly and more accurately than a larger, more cumbersome machine of the same type — on the same work. The Wade Control Center provides the ultimate in effortless control of all functions.

INSTANT REVERSING DRIVE Unlimited reversing now possible, through the use of electric clutches which provide one-second reversing without reversing or overloading the motor. (Motor is a standard, single speed type, accurately protected against overload.)

SELF-CENTERING BED Utmost accuracy assured, because the self-centering bed (flame hardened and ground) is supported on a 3-point suspension system with all components clamped in compression.

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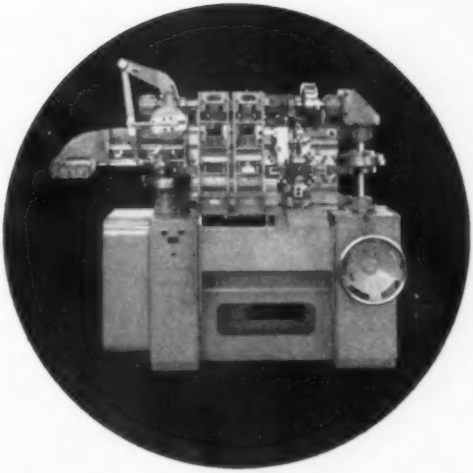
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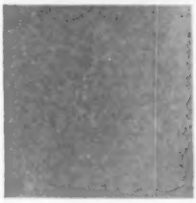
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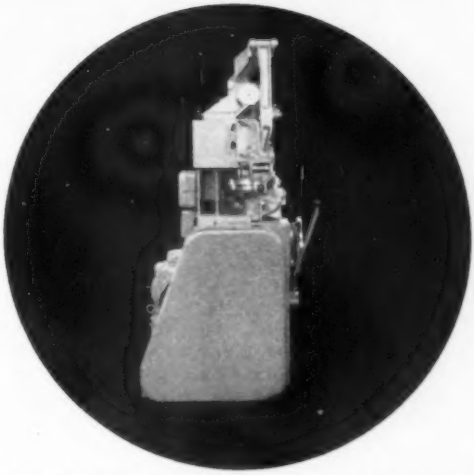
On a strict cost-accounting basis, you cannot afford not to investigate the profitability of replacement with the Torrington "Vertical Line" in the cost-critical field of wire and strip forming production equipment. Full data—or a demonstration—upon request.



$$\text{VERTICALITY} = \frac{\text{SETUP TIME}}{2}$$





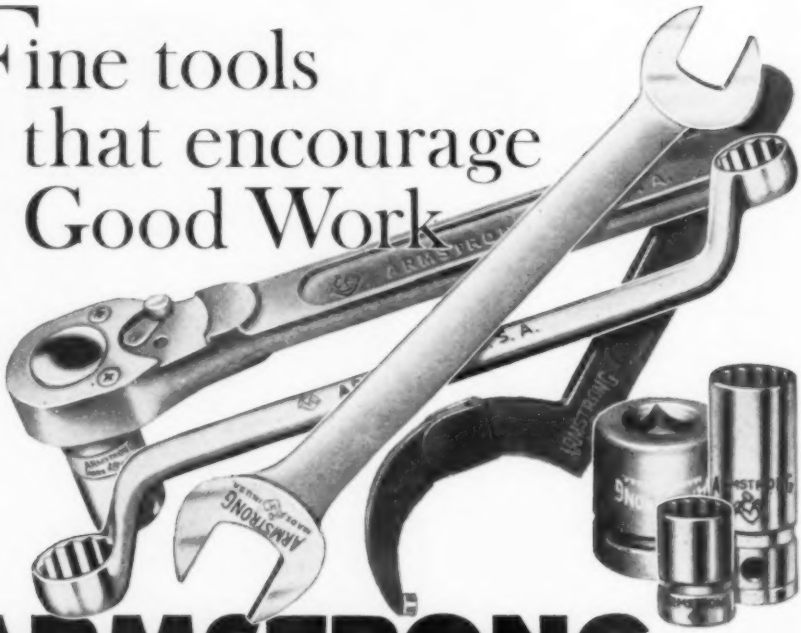


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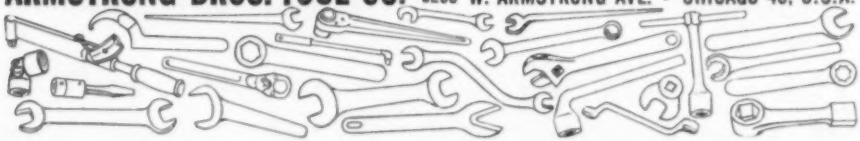


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MACHINE AND TOOL blue book

OCTOBER, 1958 VOL. 53 - No. 10

FEATURES THIS MONTH 87
LETTERS TO THE EDITOR 90
ROUNDUP OF WASHINGTON NEWS 93
THE EDITOR'S PAGE 97

Gear Design
What You Should Know About the Design and Manufacturing of Fine Pitch Gears 99
By HARRY A. DEVINE

Cutter Cooling
Cooling of Cutters by Heavy Pressure Stream Translated from MECHANICAL ENGINEERING NEWS, Moscow, USSR 104

Gun Drilling
For Speed and Accuracy in Drilling Deep Holes—Gun Drilling 112
By CLAUDE E. SONDAY

Molding
Molding Electric Plugs and Connectors 126

Stamping
Machined Sprockets to Stamped Sprockets 129

Electrolytic Machining
Now—Electro-Chemical Machining 136
By PAUL A. MELINE

Automation
New Ford Engine Plant Features Quality Control 141

Drilling
18 Operations on Motor Supports for Shavers 146

Materials Handling
Solving Its Handling Problems Leads to New Line of Products 157

Welding
Heat Program Timer Simplifies Welding of Small Assemblies 161

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SEE NEXT PAGE

continued

Counterboring Die Block Eliminates Chamfering .151
Friction Washer for Positioning Lid 151
Universal Key for Machine Tool Fixtures 152

Solving Own Materials Handling Problems Leads to New Line of Commercial Products 157
Heat Program Timer Simplifies Welding of Small Assemblies 161
Work Drivers Increase Production at Carrier ...165

Meetings, Conventions, Exhibits 88
Free Literature 167
News of the Industry 183
What's New in Metalworking 195
Mechanics Through the Ages 306
Products Index 310
Index to Advertisers 314

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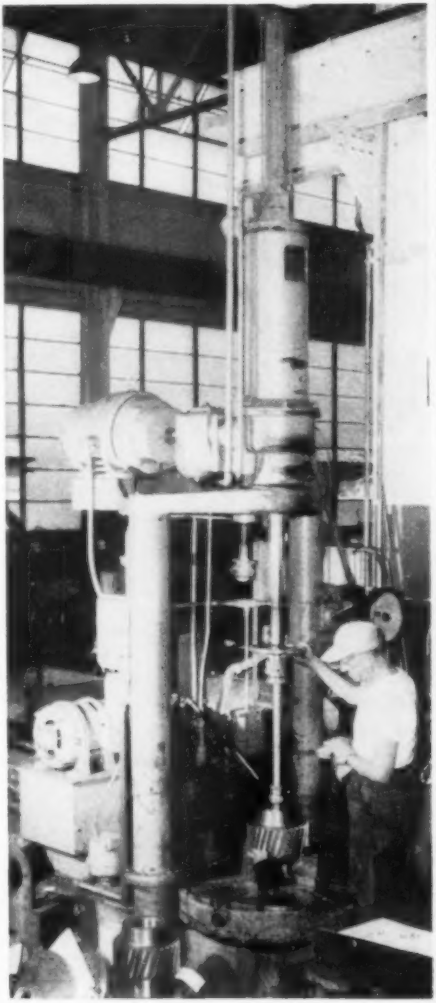
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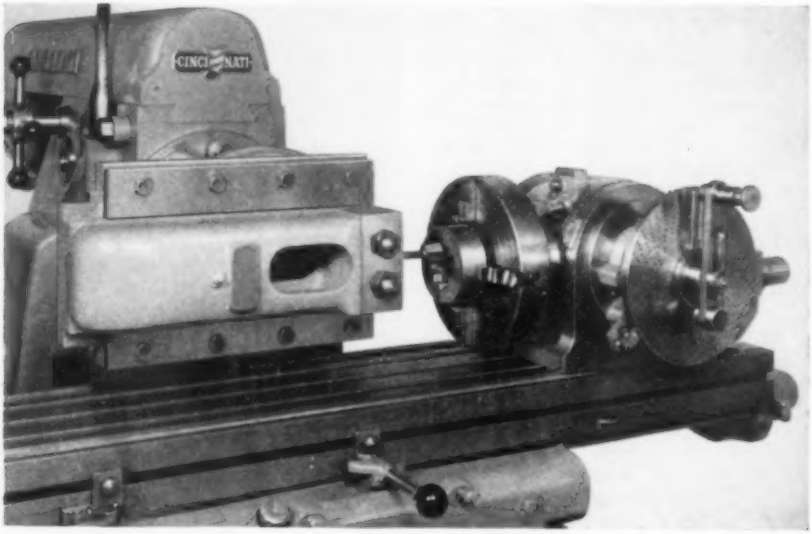
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Length of stroke	0 to 4"
Strokes per min.	same as machine spindle speed
Set of slotting tools	included
Catalog No.	M-919-1

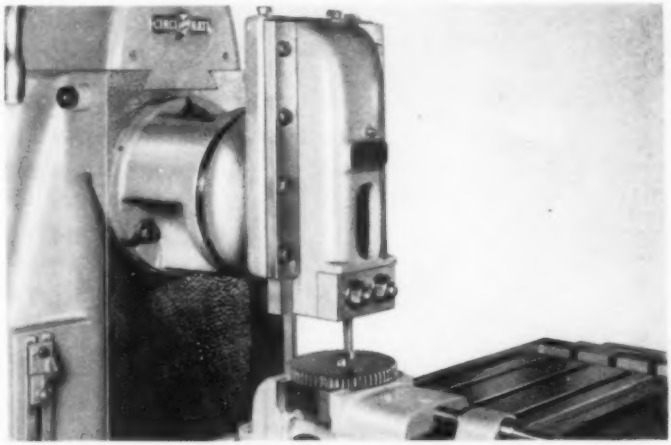
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CINCINNATI



Slotting the keyway in the bore of a gear

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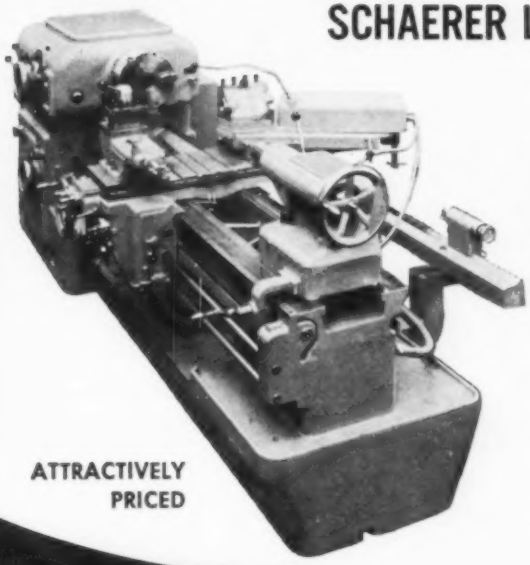
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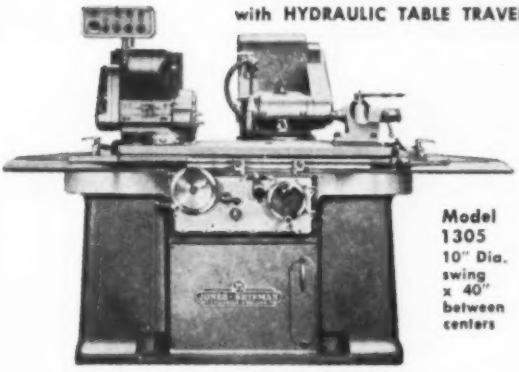
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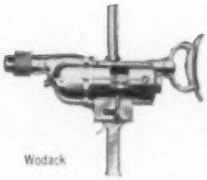
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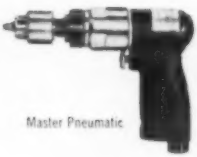

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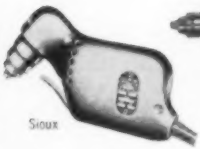


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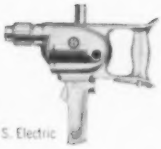

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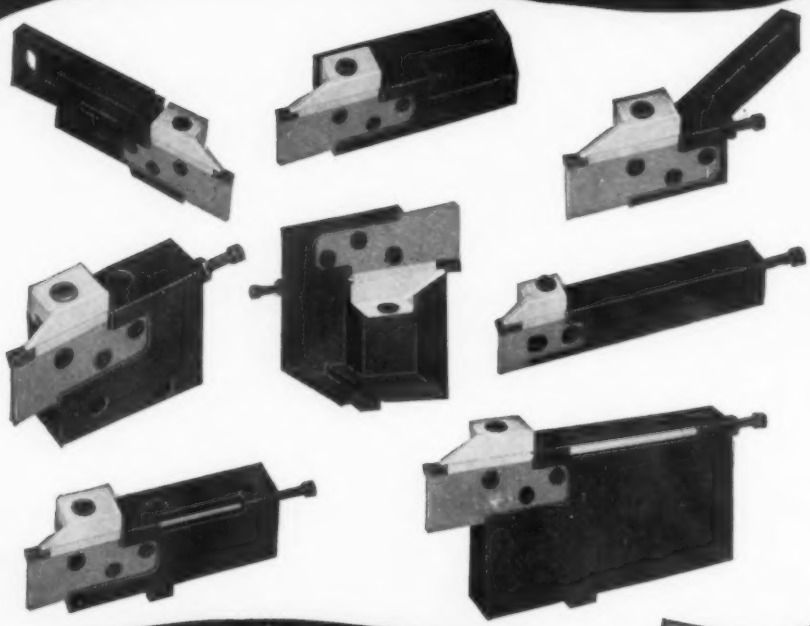


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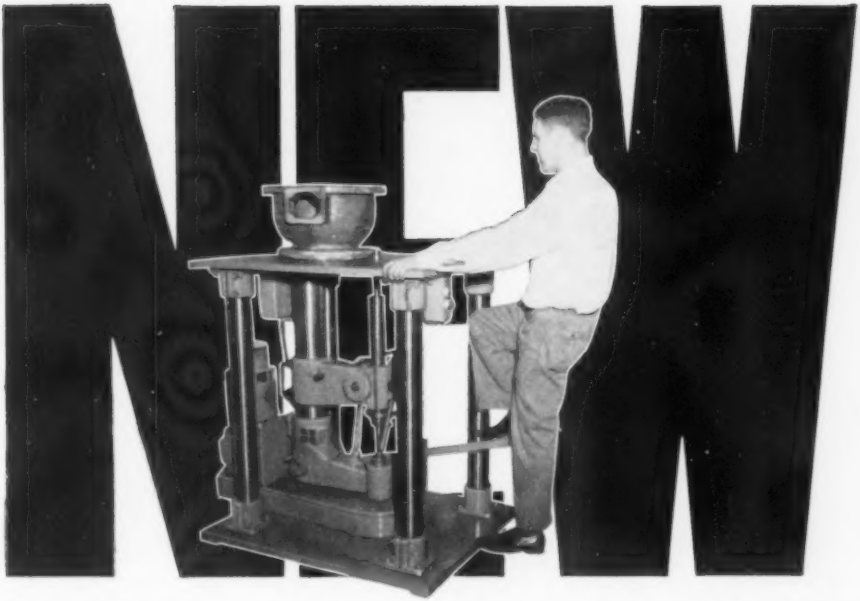


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ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.



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A Bath tap is shown in a radial drill press, being used to thread holes in a Mack truck banjo axle housing, where the carrier bolts are fastened to the banjo.

—Unretouched photo courtesy of Mack Trucks, Inc.



Another Bath Tap job well done for...

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new Fairchild F-27

have the "mettle in thei

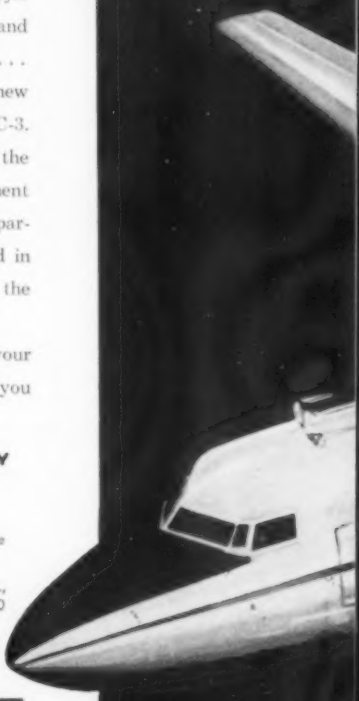


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The F-27 is made in the USA by Fairchild Engine & Airplane Corp., Hagerstown, Md. Cruising speed, 280 mph. Range up to 2500 miles. Takeoff distance, 3680 ft.

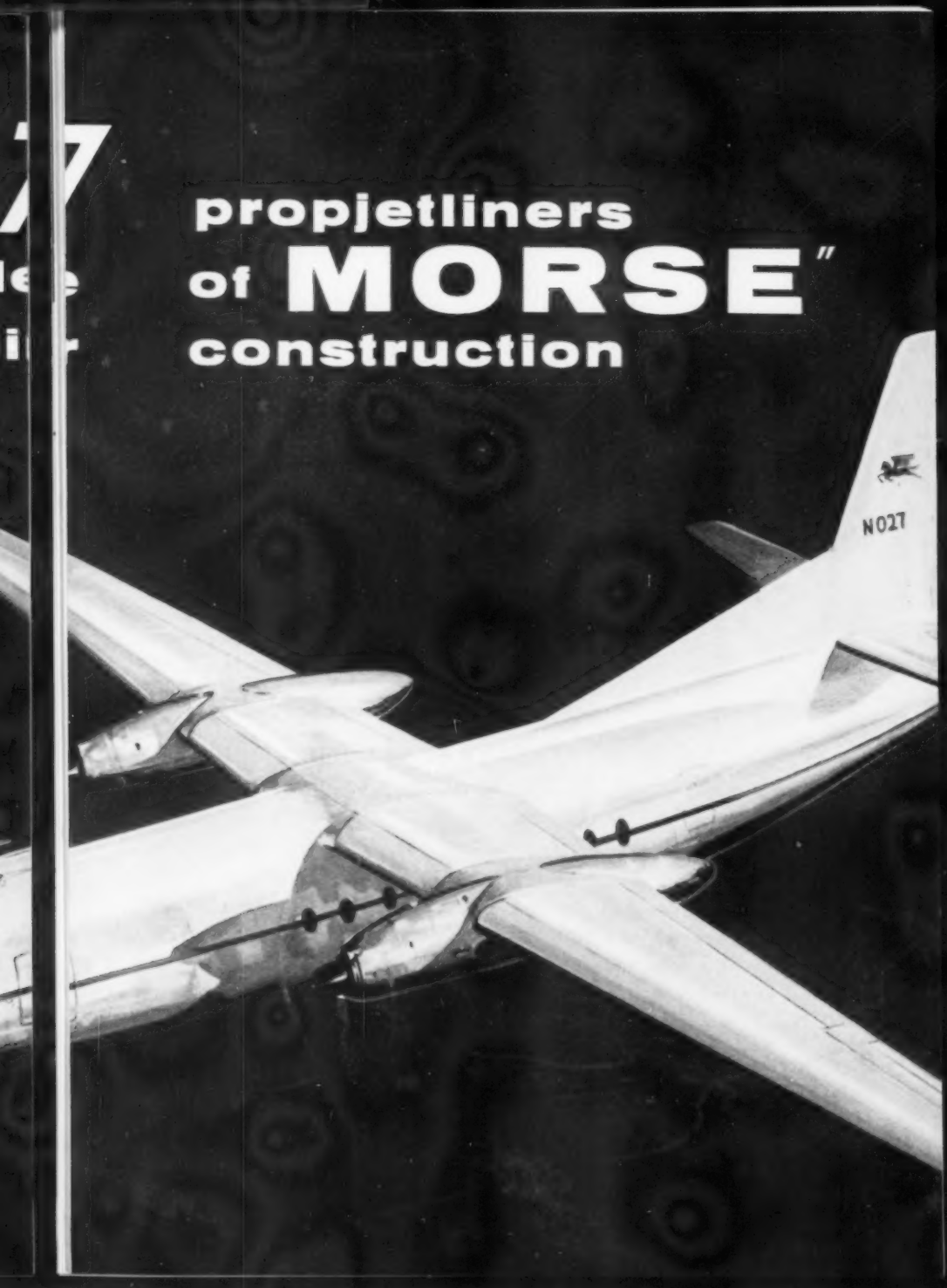
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Optical COMPARATOR

gives you precision optical inspection at a LOW PRICE all can afford!



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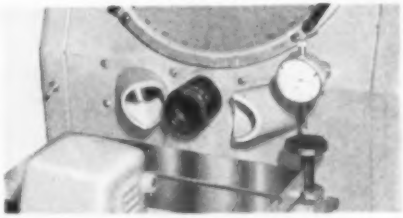
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Now every shop can enjoy the advantages of precision optical gaging and inspection. Covel No. 14 Optical Comparator out-modes mechanical checking methods, prevents costly errors, saves time and money!

The Covel Comparator is easy to use, even in brightly lighted shop areas. Has large 14" diameter screen and 6" horizontal stage travel. Rugged, precision construction throughout.

SURFACE ILLUMINATOR DOUBLES USEFULNESS!

This Covel feature permits checking blind holes, cavity shapes or other surface features on the comparator screen in the same way as shadow images are checked. Two 500 W. light beams illuminate the surface. Available at extra cost.



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EMPIRE CUT-OFF BLADES (Luers Type)

FIGHT FRICTION . . .

GIVE YOU LONGER BLADE LIFE



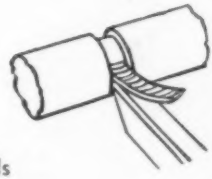


1. T-SHAPED BLADE . . .

provides liberal side clearance that eliminates excessive friction.

2. HOLLOW-GROUND TOP . . .

causes chips to collapse thus relieving friction against sidewall of cut.



3. COOLER OPERATION . . .

collapsed chips are drawn away from sidewalls permitting coolant to reach blade cutting edges.



In addition, you get blades that are *precision ground on all surfaces*—*complete blade interchangeability*—centrality of head to shank held to close tolerances—sharper cutting edges—resharpening on front face only—smoother cut-off surfaces.

The standard cut-off blade of all leading Machine Tool Manufacturers. Standard holders available for any machine using cut-off blades.

Made under license issued by John Milton Luers Patents, Inc.

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Biggest news in years—for band saw users...

NOW Victor BLADES

come packaged in NEW easy-to-use REEL-PAC dispenser...

You get much more – at no extra cost – when you buy Victor Band Saw Blades. Each 100-foot blade comes in a strong, plastic Reel-Pac – the handiest way to package blades you ever saw.

A special shield keeps the reel free-running—protects hands and package from blade teeth. Blade tension won't cause distortion or blade fouling. You can easily slide back any extra blade after you've measured off what you want.

Victor Outline Flexible Back, Gored Tooth and Skip Tooth Blades, clearly labeled with type and size, now come in Reel-Pac dispenser in sizes up to and including ½". Your Victor distributor has them now. See him soon.



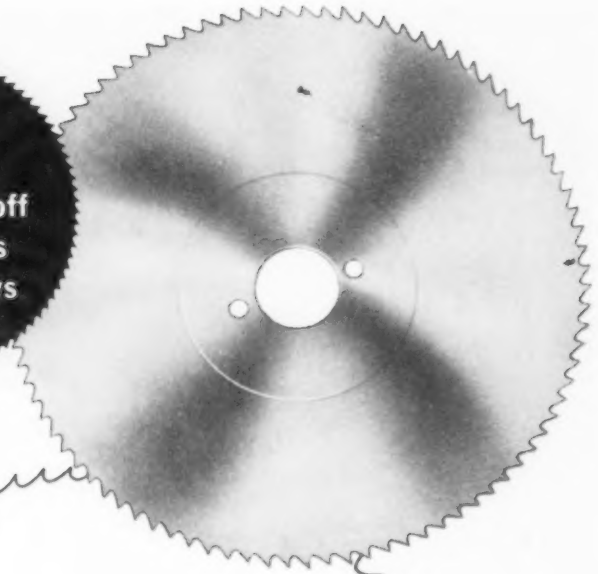
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NEW
M & M blade speeds up cut-off of soft metals and their alloys



Higher speed to boost output, greater accuracy to step up quality—that's what you'll get when you cut off soft metals and their alloys with Motch & Merryweather's new, specially-engineered PolyMetal Blade.

This new blade is tougher, longer lasting. It's made of special analysis steel that combines desirable hardness, strength, shock resistance, toughness and wear resistance to produce just the right blade for metals like aluminum, magnesium, brass, bronze, copper and their alloys.

In the PolyMetal M&M Blade, you get other outstanding features, too. Typical examples:

- **suitability for use on either hand or mechanically fed sawing machines**
- **uninterrupted performance—month in and month out**
- **easier sharpening to original cutting efficiency without special sharpening equipment**



Learn more about the PolyMetal Blade and the many advantages of making your local M&M dealer your single source for cutting tools. Call him today and whenever you have troublesome cutting problems.

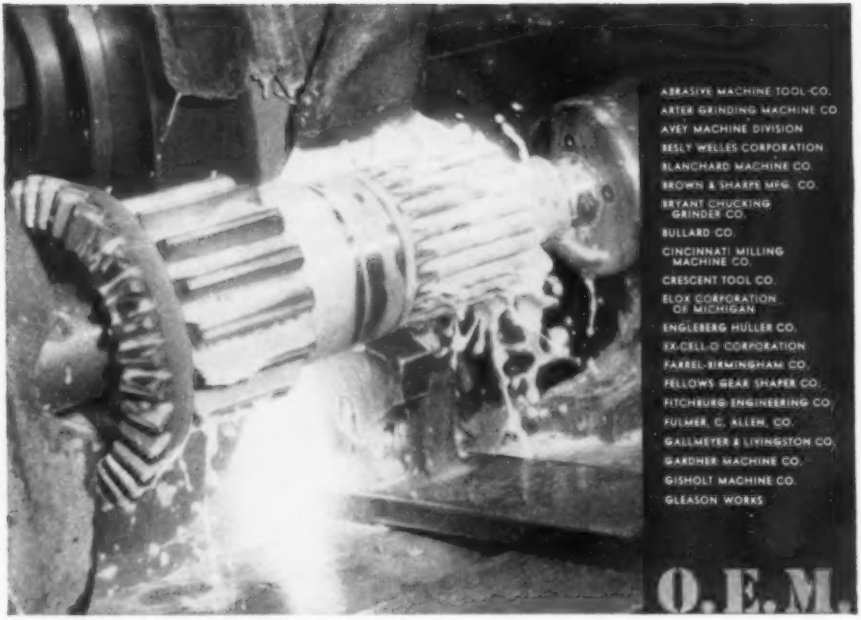
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furnish BARNESDRIL COOLANT CLEANING AS ORIGINAL EQUIPMENT!

These builders know customers are better satisfied when machines have BarnesdriL Coolant Cleaning furnished as original equipment — because they get satisfactory machine performance over a longer period of time.

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Cadillac PLA-CHEK GAGES are available in a complete range of sizes: 6", 12", 18", 24", 36", and 48" models. Precision-made risers, increasing the range of each model, are also available.

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How Earl Singleton cut the cost of

With 28 years experience in the abrasives industry, Bay State distributor Earl Singleton figures that one improvement in a grinding operation ought to lead the way to another. And, judging by the results he's produced, he's 100% right.

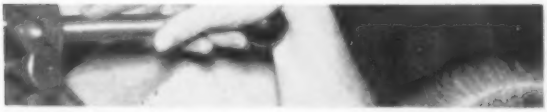
The problem: Grinding teeth on heavy traction gears for diesel locomotives.

The man: Earl Singleton, Abrasive Engineer at Browning Tool & Supply Co., Indianapolis.

Bay State distributor Singleton came up with a 14" grinding wheel that cost 14% less than the wheel it replaced and held form better, so it didn't need dressing as often.

Singleton figured they might also get more pieces per wheel if they used a slightly larger wheel. After exhaustive tests to ensure complete safety, a 15" wheel was put to work and wheel life was more than doubled... from 16-17 pieces to 35-36. Down-time was reduced, too.

Even if you seem to have no particular grinding problems at the moment, it's worth getting to know the Bay State distributor in your area. Like Earl Singleton, he may find ways to save you money that haven't occurred to the people in your shop. *Better grinding at lower cost—that is his business.*



grinding heavy traction gears



Bay State specification cut wheel cost 14% . . . *and* wheel held form so well that wheel life was doubled under regular production conditions.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Mass.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario. *Branch Offices:* Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

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GEARED-HEAD LATHES

HERE'S PROOF OF PERFORMANCE from Anderson Duggar, Jr., president of Equitable Engineering Co. — "How do we like our Clausing 15" geared-head lathe? We want another just like it! Our people really surveyed the market thoroughly before deciding on the Clausing — believe me, it's everything it looked to be and more. The Clausing is an extremely accurate lathe and its features and ease of operation are making us money."

Clausing geared-head lathes do lead their field in capacity, performance and value. Here's why:

They're bigger in capacity than other lathes in their class. Larger spindles, larger thru-hole capacity, larger bearings for heavier work. 17" lathe spindle, for example, has 3-1/16" thru hole — 15" lathe, 2-1/16" hole — 13", 1-9/16" hole.

Have heavy-duty construction throughout. Bed ways are induction hardened. Gears in head and quick-change box run in bath of oil. Power feeds are taken from separate feed rod, lead screw is used for thread cutting only. Spindles are high-tensile steel.

Built for precision performance — to American standards of toolroom lathe accuracy. Have Gamet Micron tapered roller bearings with oil flow lubrication — the most advanced and accurate bearings known to industry.

Each is an outstanding value. 13" cabinet base models, including motor and controls, start at $2113; 15" cabinet base at $2988; 17" at $4715. You owe it to yourself to investigate before investing in *any* lathe.

Lathe Capacities: 17" lathe: 54" and 78" centers, 28" swing in gap; 15" lathe: 30" and 48" centers, 24" swing in gap; 13" lathe: 24" and 36" centers, 18" swing in gap.

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SLIP SPINDLES— available in wide range of sizes. Certified alloy steel, heat treated, precision-built, lot-produced.

DRIVERS— hardened ground, precision-built, concentricity within .002". Made to automotive, ASA standards. Also Turret Tool Holders.



BRACKET SPINDLE ASSEMBLIES—exclusive flat outer-end arm design permits adjusting without breakage. Precision machined, smooth, efficient operation.

Every year more and more prominent manufacturers and machine tool builders are turning to Seibert for a part or all of their production holding tool needs. We like to believe it is because more people have come to know we take a great deal of pride and pains in producing top quality tools that will stand up and give long, trouble-free service. Whatever the reasons, it is a privilege to serve. Our expanded line of tools are precision-built to meet exacting tolerance requirements and are lot-produced for maximum economy. We think you will like our service, too. We suggest you write, wire, or phone for quotations today.

WRITE FOR NEW BROCHURE
New brochure describes our current line of adjustable adapters, drill and tap drivers, spindle assemblies, pinion drive shafts, etc.



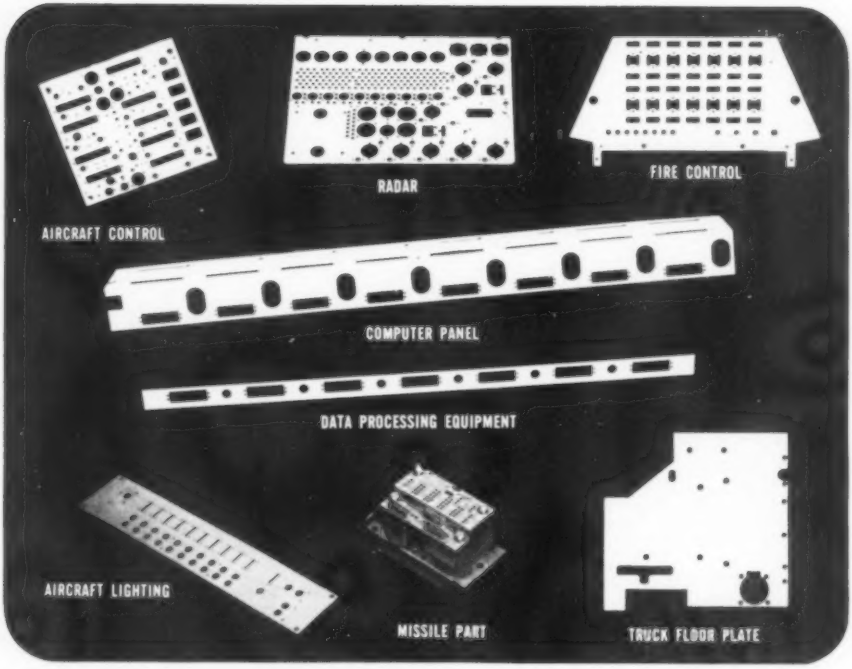


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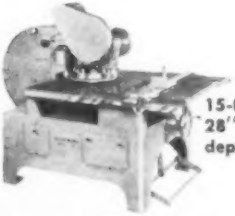
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. . . with a Wiedemann Turret Punch Press, you can pierce sheet metal components of 'most every type in 60% to 90% *less time*—and meet those "impossible" deadlines profitably.

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RA-41P Wiedemann
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Other models from 4 to 150 tons

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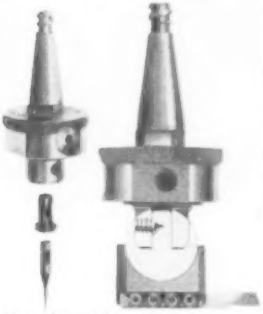
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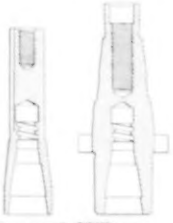
Packaged Set
includes boring chuck, reducer bushing, extension bar and tool bits.



How it works

Holes from 5/32" ... Note 1/2"–5/8" reducer bushing for either 1/2" or 1/8" shank holes.

To 5" holes ... Here 1/2" shank is merely a drawback to use nose end of chuck for stiffness.



Bridgeport Millers
can utilize Moore Boring Chuck Set by means of shank adapter at left. Another Moore adapter (right) fits machine spindles with No. 40 tapers.

One Moore Boring Chuck Set bores any hole from 5/32" to 5"

Here's an ideal way to hold down your investment in boring machine accessories. The unique Moore Boring Chuck Set is like three sets in one . . . boring the complete range of holes from 5/32" to 5". And with just one chuck for both tool bit shank sizes, you save chuck-changing time, too.

Dependable Moore-quality workmanship and design show in every detail of the chuck and tool bits. To insure years of accurate use, all chuck components, including the adjusting lead screw, are hardened and ground. The chuck is completely dust-protected, and its large, clear dial has 50 graduations . . . increases hole .001" in diameter per graduation. The chuck will start behind center for small holes and move to 3/8" plus. It's easy to unclamp, move and reclamp slide in exacting increments. One wrench fits all screws. The tool bits are available in either high speed steel or carbide-tipped.

And here's the best news of all! Originally designed for use with Moore Jig Borers only, this completely packaged boring unit can now be purchased with appropriate shank adapters to permit its use with all Bridgeport Millers or any machine with a No. 40 Taper.

For further information and complete ordering instructions, just drop a line to . . .

Moore Special Tool Company, Inc.
728 Union Avenue, Bridgeport 7, Connecticut

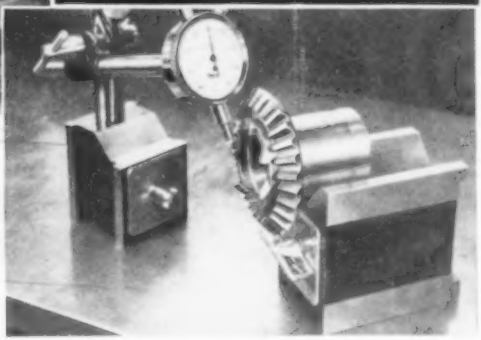
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more **adaptable**

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★ This tool will find work in every engineering plant. Available as singles or matched pairs and supplied in free polished wooden box.

Size of block, approximately 4" × 2¾" × 3¾".

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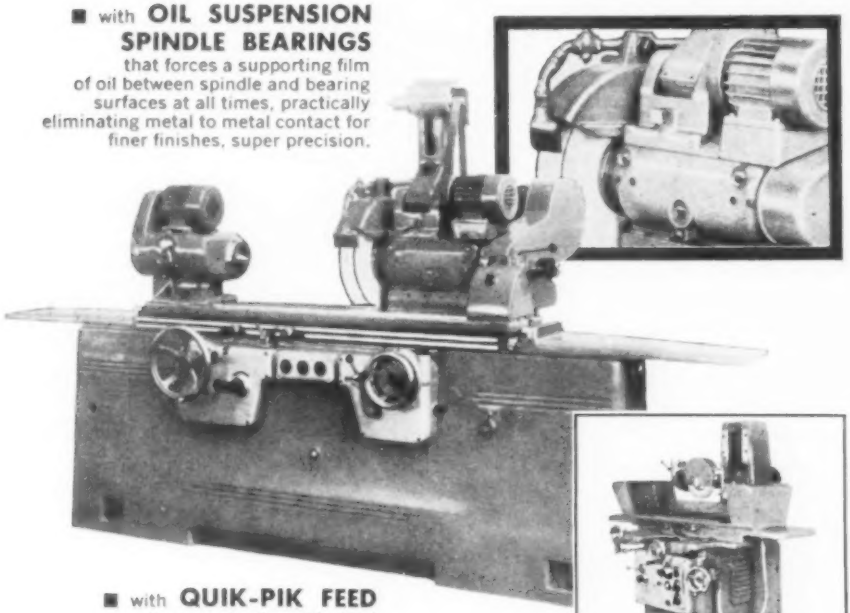
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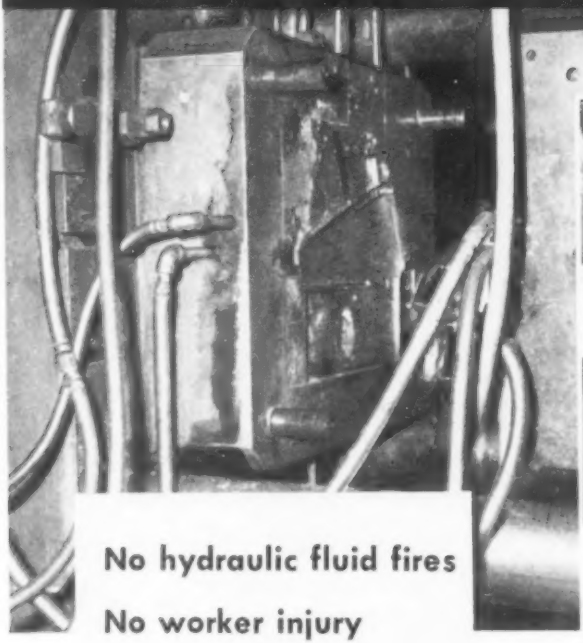
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No hydraulic fluid fires

No worker injury

No equipment damage —since we switched over to **SHELL IRUS FLUID 902"**

says Ernie Ike, Plant Superintendent
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According to Mr. Ike, these results are directly due to the switch-over in 1955 to Shell Irus Fluid 902.

Irus® Fluid 902 is a water-in-oil emulsion with relatively high water content. Irus actually snuffs out fire, *under plant conditions.*

Another important advantage of Irus Fluid 902 is its low cost. Irus Fluid costs up to one-third less than other fire-resistant fluids . . . yet is comparable in performance in every practical respect.

For information on Irus Fluid 902, write Shell Oil Company, 50 West 50th St., N.Y. 20, N.Y. or 100 Bush St., San Francisco 6, Calif.

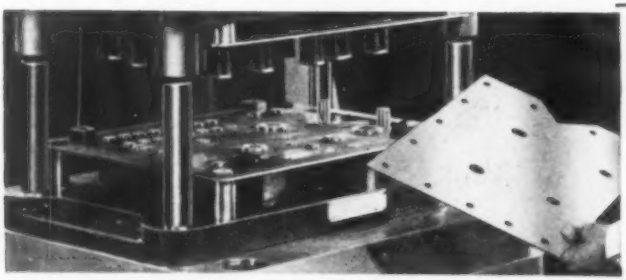
SHELL IRUS FLUID 902

a low cost, fire-resistant hydraulic fluid

SHELL

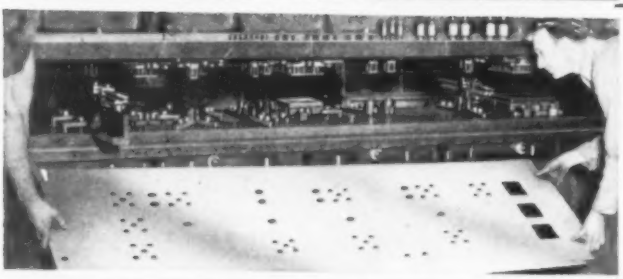
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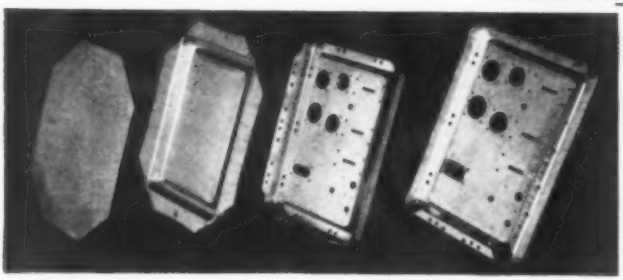
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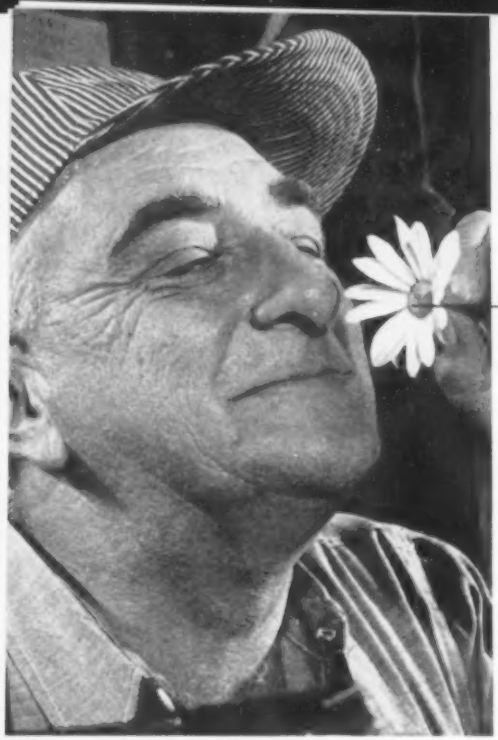
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DISCOVERED!

... new way to keep cutting fluids as fresh as a daisy!

SEE NEXT TWO PAGES



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They found that one ounce of Elcide 75 added to each 4 gallons of oil-water emulsion . . .

extended the useful life of the emulsion by 5½ times . . .

proportionately reduced down time for recharging . . .

was safe and nontoxic . . .

greatly reduced cutting oil requirements . . .

delayed odor and emulsion break for 22 weeks, while untreated machines had to be dumped at the end of four weeks . . .

eliminated bacterial slime and reduced acidic corrosion . . .

drastically cut disposal problems.

What Elcide 75 can do for you. This combination of inhibitors can extend the life of your oil-water emulsions 2 to 4 times, or more, and can dramatically cut your oil-concentrate purchases. At the same time, production will increase because you have less down time for recharging.

ELI LILLY AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION
INDIANAPOLIS 6, INDIANA TELEPHONE: MELROSE 6-2211

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This is one of the causes of emulsion trouble. These are *Pseudomonads*, one of the harmful bacteria in oil-water emulsions. These, and other bacteria, enter emulsions through the air, water, and plant debris. They set the stage for a chain reaction which causes odor, corrosion, and emulsion breakdown.

Prior to Elcide 75, no single inhibitor was able to control the full range of bacterial growth. Certain of these bacteria quickly develop resistance to single inhibitors and continue to flourish. Now, Elcide 75 controls a wider range of bacteria because it is an effective combination of proven bactericidal agents.

In certain areas where waste-oil disposal is a problem, the use of Elcide 75 proportionately reduces the size of the problem.

Elcide 75 also contributes to better products and longer machine-tool life. Bacterial contamination causes acidic decomposition of the emulsion and sets up conditions for corrosion. By controlling the bacteria, you eliminate this source of trouble.

Employees like Elcide 75 because, when added to the emulsion, it is completely safe. In another recent test involving over 1000 machines, it was shown that Elcide 75 was safe, nontoxic, and harmless to sensitive skin. It also reduces the chance for bacterial infection caused by contaminated emulsion.

You know what you get when you buy Elcide 75. With Elcide 75, you have the proper amount for effective treatment because you add it to your emulsions right in your plant. The standard recommendation is one ounce of Elcide 75 per 4 gallons of oil-water emulsion.

Prove it to yourself . . . try Elcide 75 in your plant. The best way to determine the value of Elcide 75 is to try it under your normal plant conditions, using your regular oil-water emulsion. After you've had an opportunity to compare results, we believe you'll agree that Elcide 75 is a valuable discovery that will greatly increase your plant efficiency.

PRODUCT SPECIFICATIONS
ELCIDE 75

(Lilly's brand of bactericide for cutting fluids)

Active ingredients—Thimerosal (Sodium Ethylmercuri Thiosalicylate) and Sodium o-phenylphenate.

Package	Price per Gal.
1-gallon polyethylene	$8.50
5-gallon polyethylene	$8.00
55-gallon stainless steel	$6.50

Terms: 1%, 10th prox.; net, 30th prox. F.O.B. Indianapolis. Transportation paid via carrier of our selection.

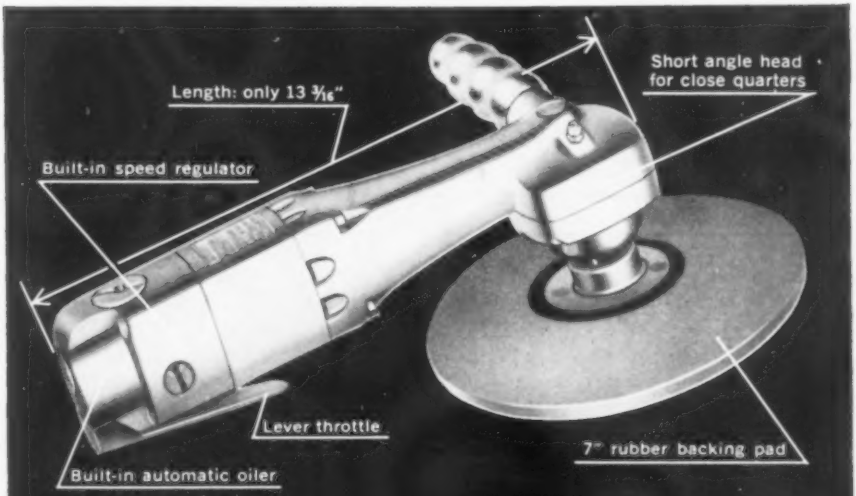
For information or to place your order, phone or write.

ELCIDE 75™

PATENT PENDING

Lilly

POWER to boost job efficiency with REMINGTON tools



Sander, Model PS-A-307L — Air-powered; speed: 5,900 rpm at 90 psi.; built-in automatic oiler and speed regulator; short angle head; only 3½" high; complete with 7" rubber backing pad, assorted 7" abrasive discs and wrench; wt.: 5¾ lbs. complete.



Polisher, Model 47P — 8" bonnet; free speed: 1400 rpm; load speed: 840 rpm; 115 or 230 volts; heavy-duty ball bearings; wt.: 12 lbs.; with eye-bolt for reel suspension.



Reversible Screwdriver, Model PSDR-204P — Air-powered; reverses with a flip of a lever; adjustable clutch sets screws within 5% of set torque; speed: 1500 rpm at 90 psi.

Remington delivers mobility and all the power you need to help cut production costs. With Remington you can standardize on the industry's widest selection of power tools—air, electric or gasoline-driven—with parts and service from one source. For free booklet describing the complete line of Remington Contractor and Industrial Tools mail Readers' Service card or see your local Remington distributor.

Remington

Remington Arms Company, Inc., DUPONT
Bridgeport 2, Connecticut.
In Canada: 36 Queen Elizabeth Blvd., Toronto, Ontario.

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Automatic NUT TAPPING MACHINES

This installation *at Shakeproof, Division of Illinois Tool Works, Elgin, Illinois,* is an illustration of productivity—*with precision.*

Simplicity of set-up and lower operational costs can make your Nut Tapping Department one of the most efficient and profitable in your plant. Submit samples and prints for a comparison with your present method.

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VERTICAL TAPPING MACHINES
VERTICAL THREADING MACHINES
TWO SPINDLE MACHINES
ANGULAR MACHINES
NUT TAPPING MACHINES
HORIZONTAL MACHINES
DRILLING AND TAPPING UNITS
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435 EASTERN AVENUE, BELLWOOD, ILL.
(Suburb of Chicago)

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ORIGINAL Swedish

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TAPMASTER
Tapping Attachment

available now only through

Homestrand, inc.

S P V features:

- Axially floating spindle—No axial force acts on the tap. It threads itself weightlessly into the hole. A perfectly dimensioned tap gives a perfect thread regardless of operator's skill.
- Precision lifetime clutch—easily adjustable to desired torque by turning the sleeve.

S P V offers you:

- Perfect threads
- Lower production cost
- Longer tap life
- Lower investment

REPRESENTATIVES WANTED
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Homestrand, inc.

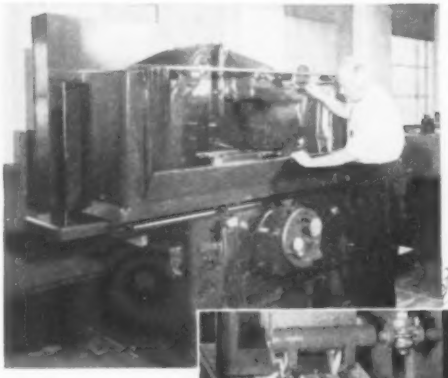
9 Addison Street, Larchmont, N. Y.

S P V Tapping Attachments are guaranteed to produce the most threaded holes, to specified tolerances, per dollar spent.

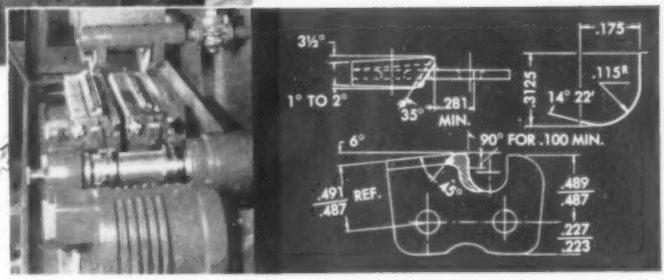
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Thompson — TRUFORMING CUTS COSTS 60%







For 140 years, the policy of The Draper Corporation of Hopedale, Mass., has been to offer the highest quality product at the least possible cost.

Following this policy, its subsidiary, BlueJet Corporation, manufacturers of the famous BlueJet saw chain, installed a Thompson Truforming grinder to grind the cutting edges on their chain saw routers. These routers were formerly ground, piece by piece, by a force of 8 employees.

The Thompson Truforming operation is now cutting former grinding costs by 60%. 3 men only are now required for the operation. 40 L.H. and 40 R.H. routers are now ground simultaneously with one pass of the crush formed wheel, resulting in a day's production of over 12,000 pieces—many times that produced by the former method. Both the uniformity and sharpness of the routers have been greatly improved.

For 25 years, Thompson has pioneered and developed the modern advances in crush form grinding. If you have a time-saving, product-improving or cost-cutting problem in your operations, it will pay you to investigate the work Thompson Truforming grinders are now doing in plants all over the country. Our engineering experience is available to you without obligation. Write for Catalog T558.

"Keep Thompson in mind for the daily grind"

THE THOMPSON GRINDER COMPANY

SPRINGFIELD, OHIO

Thompson SURFACE GRINDERS

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Unique *Buck* GEAR Chuck

Holds wide range of diameters within .0005″ on pitch line

ILOGAN Lathe in Photo



Commander Mfg. CO. gets remarkable results

Commander, of Chicago, used to need 4 operations to process this gear; Hone I.D. of hob gear, grind O.D. of gear on arbor, press in oilite, use pot chuck on O.D. to bore oilite to .0004" tolerance.

The Buck gear chuck eliminated operations 1 and 2, speeded up 4 by 40%. Tolerance was held, scrap entirely ended. The former problem of runout from pitch diam. to I.D. was licked—it is now held to .001" with production of 70 to 85 pieces per hour.

Brings new flexibility, new low cost to gear I.D. boring and grinding

You see here the *only* chuck that gives you broad capacity in holding gears of different diameters—and holds them *within .0005" precision* on the pitch line. It's a combination of the Buck DUST-PROOF chuck and its master jaws (with full center hole capacity) plus angulate jaws to fit gear teeth. As with every Buck chuck development it is logical, it is simple, *it works*, and the cost is but little more than the standard Buck chucks.

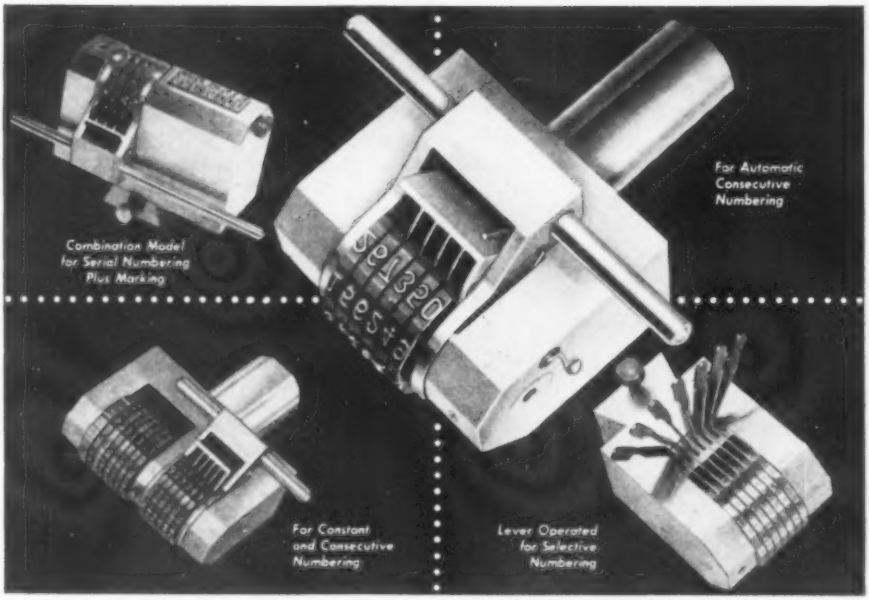
Send for complete details. See why, more than ever, *"It pays to chuck with Buck."*

The Buck line includes Scroll, Dust-Proof, Power, Independent chucks, Boring Bars.

BUCK TOOL COMPANY

1012 SCHIPPERS LANE • KALAMAZOO MICH.

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NOBLEWEST *Precision Numbering Heads*

1 2 3 4 6 6
1 2 3 4 6 7
1 2 3 4 6 8
1 2 3 4 6 9
1 2 3 4 7 0
1 2 3 4 7 1

Fast, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for *constant, selective* and *consecutive* numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines—wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to ½". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies. Write for new catalog. The Noble & Westbrook Manufacturing Company, 9 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

MARKING
NUMBERING
EMBOSSING
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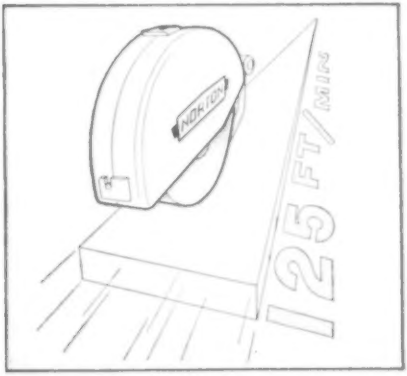
Now—FINISH FLAT



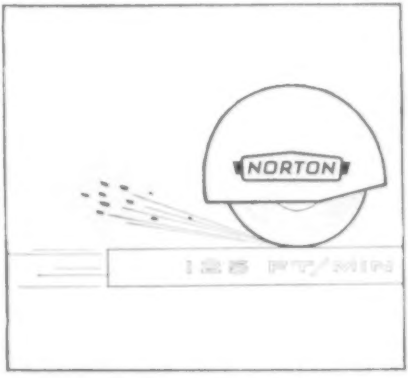
Profit from these benefits . . .

1. Get Jobs Done Fast and Cool — high table speed, *125 feet per minute, maximum.* **2. Handle Tall Work Pieces** — greater vertical capacity, *15".* **3. Get Lasting Accuracy** with guide-rail cross slide construction. **4. Control Vertical Feed Accurately and Position Fast** with two-speed .0001" increment hand wheel. **5. Benefit from Better Sighting and Loading** due to contoured splash guards. **6. True Forms, Even on Worn Wheels** because of recessed wheel spindle housing.

These and many other new features make this machine a "must" for your surface grinding jobs.



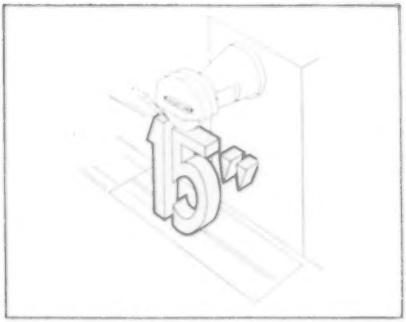
Finish flat faster, cut grinding time and increase production, with high table speed, 125 feet per minute.



Heat goes off in the chips, due to new, high table speed. This cooler grinding permits faster production on heat-sensitive metals.

FASTER... at lower cost

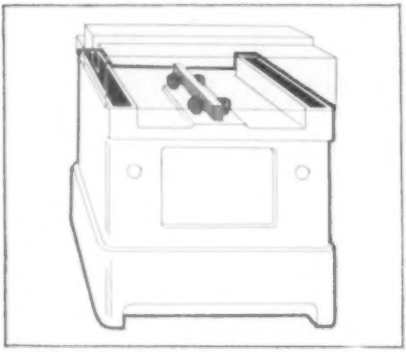
New Norton 6" x 18" Surface Grinder ready for immediate delivery



Handle taller work pieces with high-grind wheel head construction. The vertical capacity from the table top to the bottom of standard full size 8" diameter grinding wheel is 15"

You FINISH FLAT FASTER with the new Type S-3 hydraulic which is equally efficient for long production runs or a wide variety of toolroom grinding because of its new cost-cutting features. It produces plane surfaces smoothly — with automatic or manual cross feed and with such fast, cool-running action that it saves time and money on every job.

Ask your Norton Representative for the whole story. Or write us direct for Catalog 2128. And remember: only Norton Company offers you such long experience in both grinding machines and grinding wheels to bring the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.



Widely spaced, flat ways and guide-rail cross slide design maintain cross feed accuracy, providing lastingly accurate grinding of shoulders or parallel surfaces.

To Economize, Modernize with **NEW**

NORTON

GRINDERS and LAPPERS

Making better products... to make your products better

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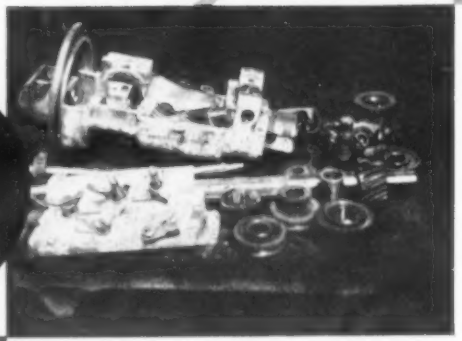
BULLARD

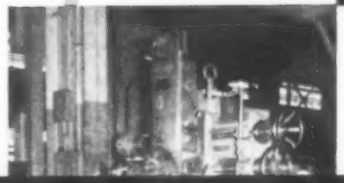
rebuilds from the ground up



Yes — we disassemble each machine right down to the bed.

Each individual piece is cleaned and inspected





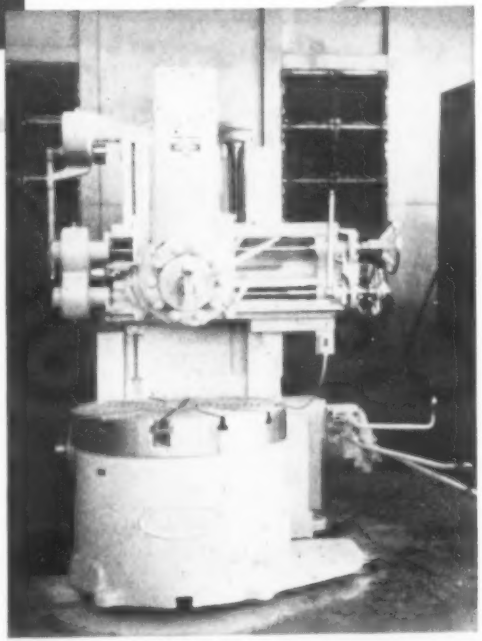
What does this mean

1. Thorough workmanship



and if found serviceable is re-used, if not, it is replaced.

this mean to You?



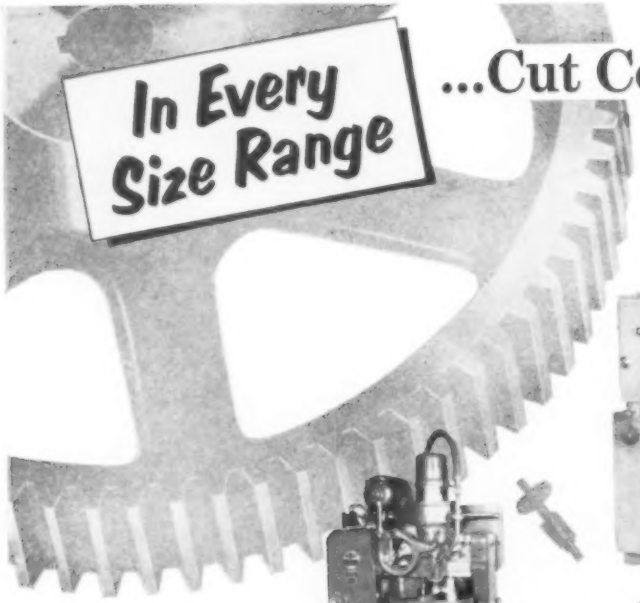
1. Thorough workmanship by the same skilled craftsmen that built the machine.
2. Only "original equipment" precision replacement parts, where necessary.
3. Fast service.
4. One year guarantee on all parts replaced — including labor.

If you're planning to rebuild any of your Bullard machines contact your nearest Bullard Sales Office or Distributor for a quotation or write

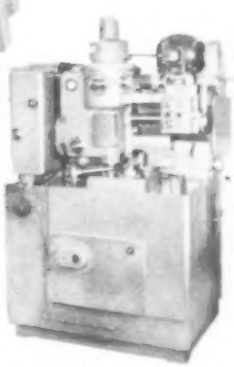
BULLARD

THE BULLARD COMPANY BRIDGEPORT 9, CONNECTICUT

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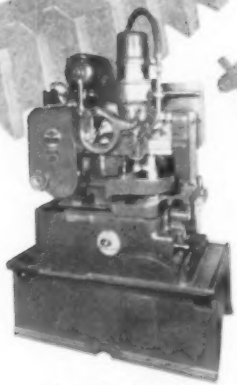


...Cut Costs with



FELLOWS NO. 4GS

Among the products for which gears are cut on the 4GS are automatic transmissions, gasoline motors, hoist and well drilling equipment, computers and aircraft reduction gear units.



FELLOWS 7A-TYPE

Gears cut on the 7A are used in textile machinery, servo-mechanisms, washing machines, cash registers, lawn mowers, machine tools and motorcycle engines.





FELLOWS 3-INCH FINE-PITCH

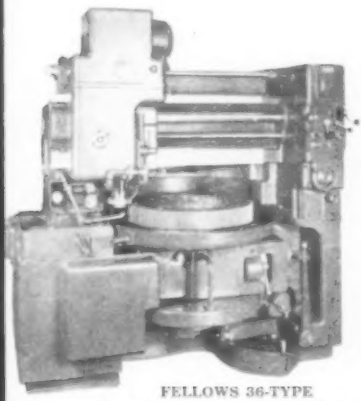
Used to cut gears for computers, bomb director and gun fire control systems, aircraft and flight control instruments, cameras and electro-mechanical mechanisms.





THE
PRECISION
LINE

Fellows Gear Shapers



FELLOWS 36-TYPE

Gears for construction equipment, textile machines, mining machinery, industrial truck transmissions, tractors, cranes and hoists are cut on this machine.



FELLOWS 120-INCH

Large, heavy duty gears for power shovels and other road construction equipment, heavy cranes, gun segments, tank turrets and winches are cut on the 120-Inch.

Modernizing cuts costs. In many plants the speed and versatility of new Fellows Gear Shapers has lowered gear production costs by more than a third and repaid the investment in just a few years.

Gear Shapers are ideal for many non-involute shapes too, such as internal and external splines, cams, clutches and nearly every other conceivable shape. Modifications to the Gear Shaper permit rapid, economical production of oval or elliptical gears. Fellows machines are available for either full- or semi-automatic operation for high speed, long-run production with a minimum of operator attention.

Your Fellows representative can show you where and how new machines from Fellows' Precision Line can lower your costs for small lots as well as for long production runs. Ask him for the facts.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

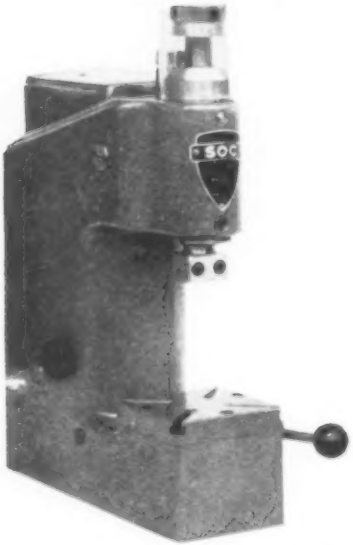
Fellows *Gear Production Equipment*

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presenting the LIP

PNEUMATIC PRECISION PRESS

for staking • riveting • forming • punching • embossing • marking



Designed to meet the increasing demand for a sensitive air operated press in the following type industries.

* **Instruments**
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* **Watches & Clocks**
* **Precision Components**

SOC Presses provide many features never before incorporated in a single unit: *Micrometer adjustment for depth of stroke. *Control over length and speed of stroke without changing pressure applied. *T Slots in base for simple and accurate fixture mounting. *Precision vibration free operation with easy installation and minimum maintenance.

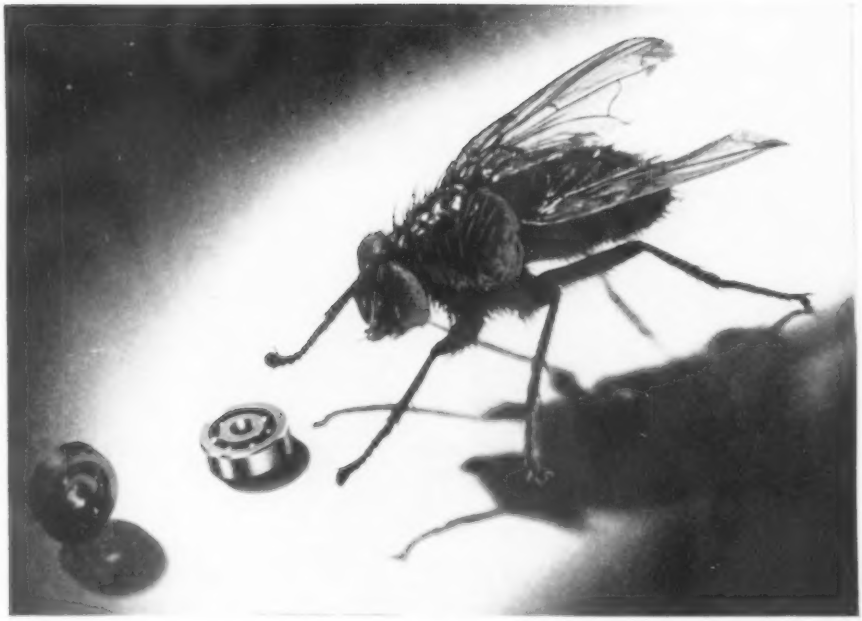
Several exclusive territories available. For further information contact:

AMERICAN LIP CORPORATION

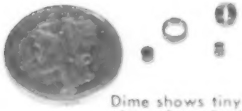
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Can parts this small be barrel finished?



Dime shows tiny size of typical bearing races.



Twin-barrel ALMCO Supersheen Model D80-1A used by Miniature Precision Bearings to process the tiny bearing assemblies.

EMPHATICALLY, YES! For example, precision deburring and finishing of small parts with ALMCO barrel finishing equipment is an important operation at the modern new plant of Miniature Precision Bearings, Inc., Keene, N.H.

M.P.B. makes miniature ball bearings, some with assemblies so tiny that 500 can be carried in a thimble. ALMCO precision equipment and methods are used to improve surface finish on the inner and outer races, as well as removing burrs, sharp edges and machining lines.

Production usually runs 1,000 to 4,000 parts per load, and occasionally 5,000 to 15,000. All told, millions of parts yearly are finished the ALMCO way at Miniature Precision Bearings!

If you have finishing problems with your parts, small *or* large, perhaps ALMCO has the answers. It's easy to find out. Just write on your letterhead asking for an ALMCO sales engineer to call. Or, if you prefer, send sample parts and specifications desired direct to ALMCO's main lab at Albert Lea, Minnesota.

SEND FOR FREE 52-PAGE HANDBOOK

Tells all about modern precision barrel finishing processes. Facts, photos, data and cost comparison charts.

ALMCO

QUEEN PRODUCTS DIVISION

KING-SEELEY CORP.

410 Marshall St. • Albert Lea, Minnesota

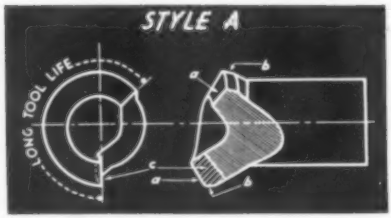
Sales and Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia

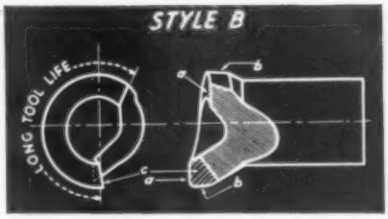
IN ENGLAND: *Almco Division of Great Britain, Ltd., Bury Mead Works, Hitchins, Herts, England*

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BOKUM BORING TOOLS

are *Designed* for BORING





Combined helical (a) and radial (b) backed-off cutting form permits resharpening on only one face (c).



STYLE A
for general boring



STYLE B
for bottoming and facing



STYLE C
for internal threading

Design is based on a mathematical formula which guarantees correct cutting and clearance angles anywhere around the periphery of cutting head—maintained uniformly within limits of ± few minutes of 1°.

Bokum tools are available in 3 cutting materials: (1) super high speed steel, Cat. 1139-6; (2) carbide tipped, Cat. 398; (3) solid carbide, Cat. 948.

In range of sizes to bore holes from 1/16″ dia. up.

To extend further the already long life of Bokum Tools, we recommend the Resharpening Fixture, Cat. AB1 and AB412. Tool holders, vertical adjustment and fixed position, Cat. 483. Write Dept. H

Because Bokum Boring Tools are ***designed,*** *they are uniform and remain uniform.*



TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO. INC. 14775 Wildemere Ave. Detroit 38, Mich.

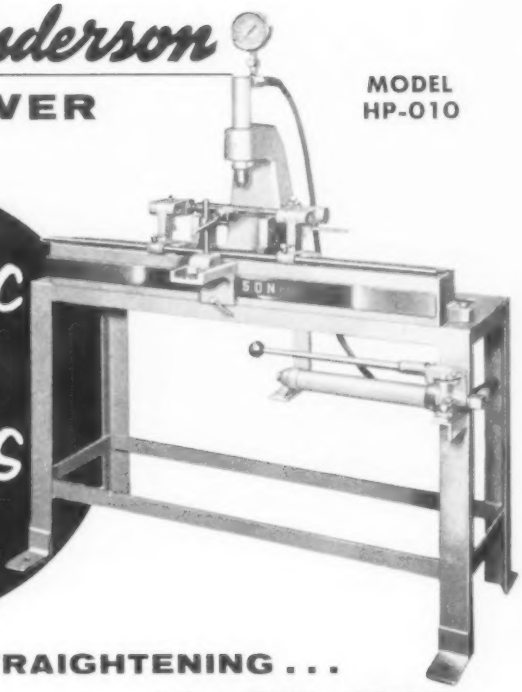
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ANOTHER *Anderson*

TIME-SAVER

MODEL
HP-010

Hydraulic Hand Presses



ACCURATE STRAIGHTENING . . . AT LOW COST

The Anderson Hydraulic Hand Press was developed to *reduce costs.* Checking and straightening are accomplished in one position . . . eliminating the time consumed shifting parts back and forth from checking fixtures to straightening anvils. Efficient hand hydraulic pumps power various models of presses ranging in capacity from 10 to 50 tons. Attachments make possible the checking of stepped or odd shaped parts with centers. Different lengths of work can be handled by easy adjustment of rolls and centers. A pressure gauge is standard equipment. A special attachment is an indicator calibrated to thousands of an inch for locating high and low spots on the work, and to indicate how much the shaft is bent under pressure. An Anderson Hydraulic Hand Press can help you solve your straightening problems.

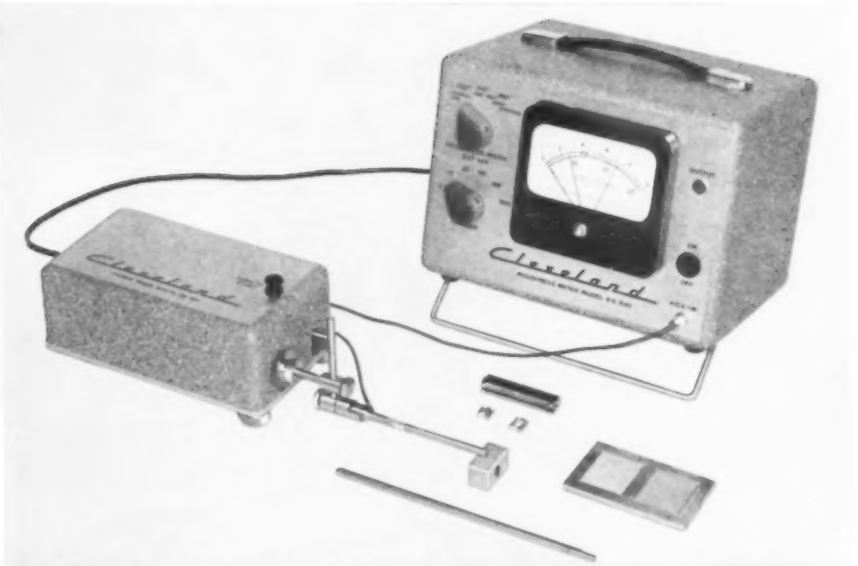
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ANDERSON BROS. MFG. CO.

ROCKFORD, ILLINOIS

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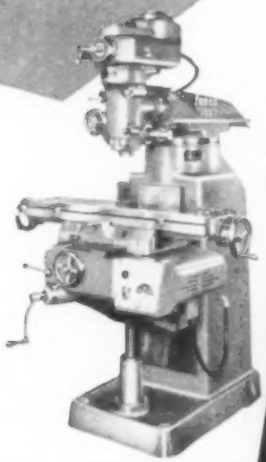
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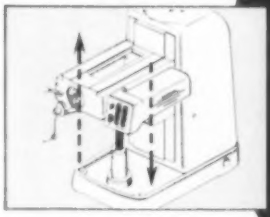
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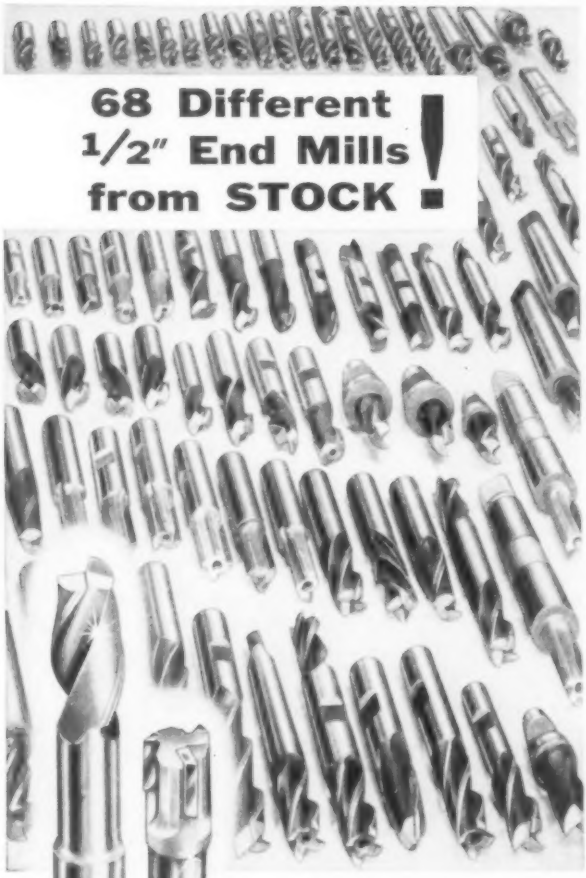
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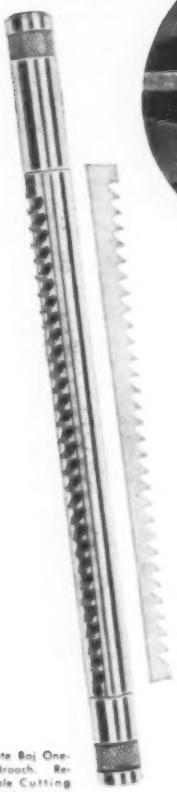
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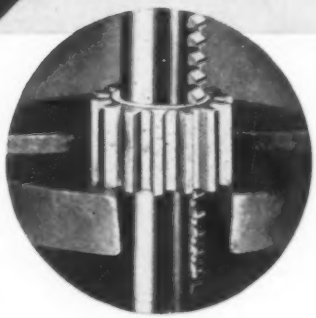
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The *Baj* One-Pass Push Broach

. . . for High Accuracy Production Keyway Cutting



Complete Baj One-Pass Broach. Replaceable Cutting Blade shown at right.



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*** ECONOMY**
*** SPEED**
*** ACCURACY**

This new broach is a non-adjustable version of the Glenny Adjustable Expansion Broach formerly produced by the East Shore Machine Co., Cleveland, Ohio. Both of these excellent tools are now being manufactured and sold by The Baj Tool Co.

For high accuracy production keyway cutting, the Baj One-Pass Push Broach introduces these outstanding features:

1. SIMPLE, FAST AND EASY TO OPERATE—a complete unit with no accessory parts. No guessing. No measuring. Broach is preset for standard sizes. Just pull the arbor press handle and it positively cuts its own way. Minimum set-up time.
2. REPLACEABLE HIGH SPEED STEEL CUTTING BLADE.
3. EXCLUSIVE BODY DESIGN—totally houses replaceable blade, adds strength for safety. Allows coolant flow to accelerate cutting action. Extends broach life.
4. HIGH ACCURACY—keyways are cut straight and centered, accurate to .0005 plus or minus.
5. LONG LIFE—production reports claim up to 100,000 keyways without replacing the Baj Keyway Broach. The easy cutting, trouble-free and time saving features of this new production broach introduces new economies in keyway cutting that repays—many times over—the original low cost of the broach.
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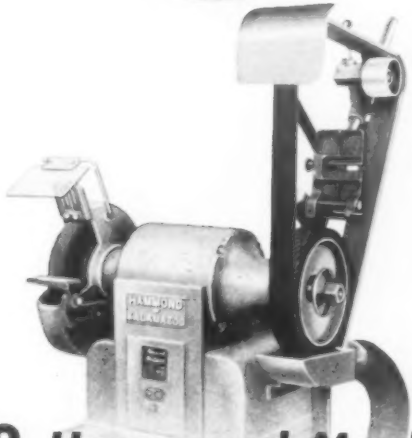
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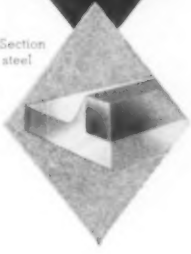
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Photograph courtesy of the Ready Machine Tool & Die Company, Inc., Connersville, Ind. shows Ohio Knife Co. Composite Die Sections on a blank and pierce die for a 4' x 6' refrigerator inner food compartment.

there's a NEW way to build your dies

OK Die Section shows tool steel clad to mild steel backing



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Hundreds of companies who have switched to OK Composite Die Sections available for Cutting, Trimming and Forming Dies, report great time and money savings, plus longer die life. For new bulletin on OK Composite Die Sections and Clad Aluminum Bronze Wear Plates, write **Dept. 47-D.**

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CINCINNATI 23, OHIO

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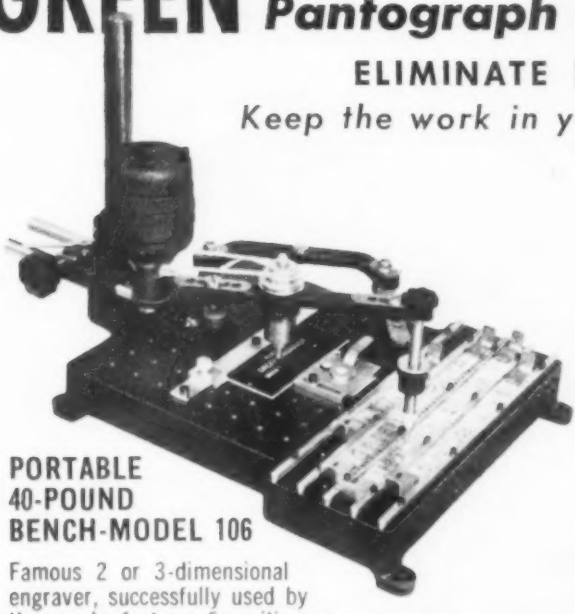
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The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

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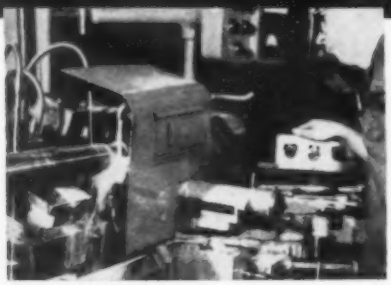
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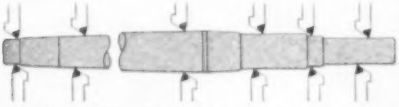
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Talide Tools and Dies Get Results!



Caterpillar Tractor Co., leading tractor and earthmoving equipment maker, has used cost-cutting Talide tools for over 10 years. See below.

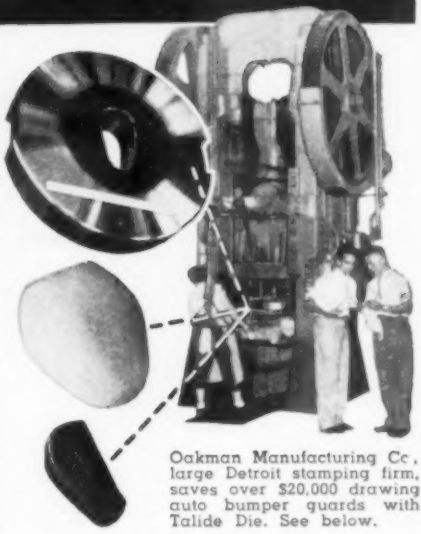


CRAWLER TRACTOR AXLE SHAFT

MATERIAL—SAE 8645 Steel Forging, 3.6mm Brinell Hardness.

OPERATION—Turn all diameters, form tapers, shoulders and steps.

RESULTS—Talide Grade S-92 turned 7 shafts per corner per grind. Total—42 shafts per grind. Inserts ground averaged 6 times. Produced 294 shafts over life of insert. Next best premium carbide grade produced 235 shafts.



Oakman Manufacturing Co., large Detroit stamping firm, saves over $20,000 drawing auto bumper guards with Talide Die. See below.

● Old chrome plated die surface had to be stoned every hour—hand polished after each day's run—completely reworked and plated after 60,000 parts. Grade C-80 Talide Die installed over 8 months ago, has drawn over 800,000 parts with no wear evidence. Buffing operation (25c per piece) eliminated due to brighter, smoother, more durable finish with Talide Die.





Constant Research Pays: Year after year Talide Metal improves in hardness, strength, rupture resistance, and crater resistance. It is processed in latest type electric vacuum furnaces under rigid lab control, giving uniform quality.



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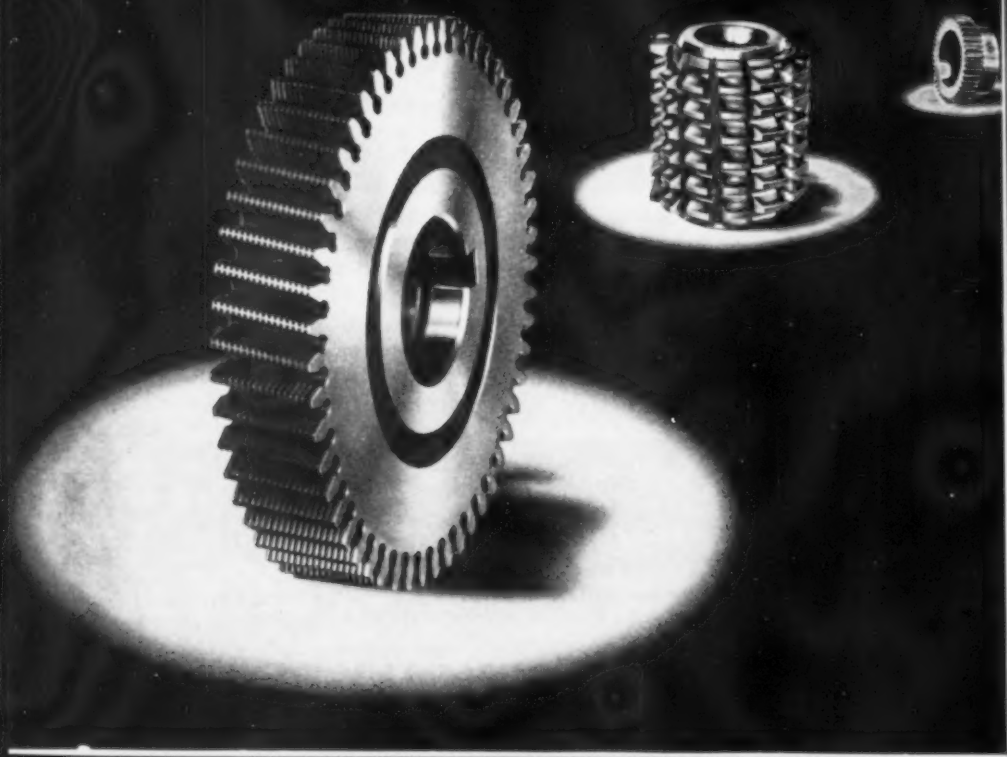
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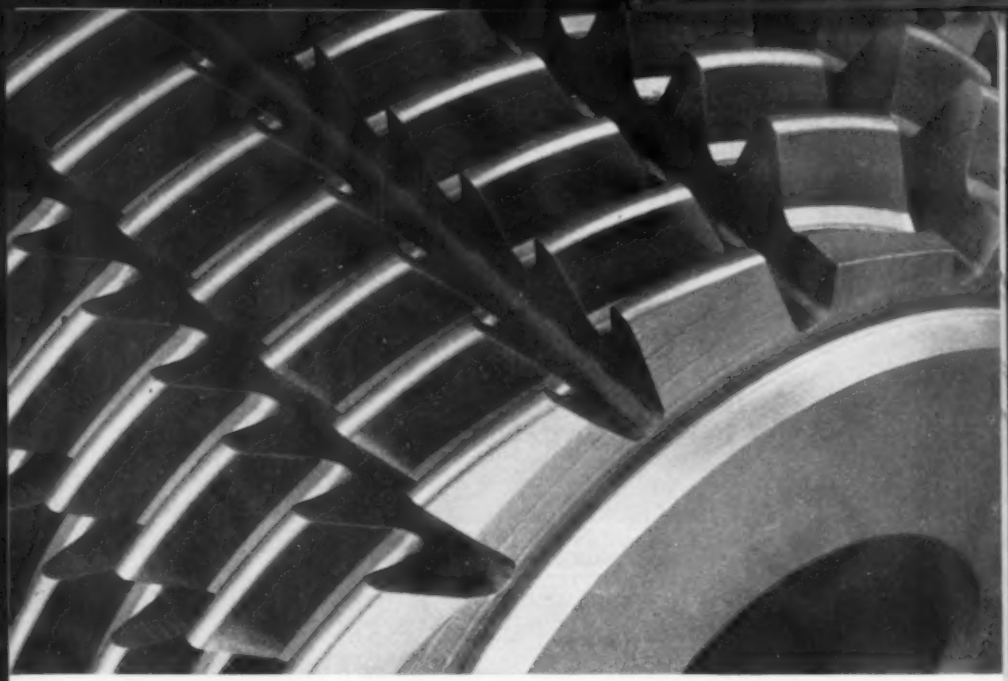
the Finest Tools come from GEAR PRODUCTION HEADQUARTERS

MICHIGAN TOOL Company

from blank to finished gear

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Finish obtained in machining REX M-2-S eliminates the need for finish grinding this 4" x 4" unground double thread cutting hob.

Hobs seldom need finish grinding when made of low cost REX M-2-S

This is the actual finish obtained—without costly finish grinding – with REX M-2-S,® Crucible's *sulfur-bearing*, tungsten-molybdenum type high speed steel. The chemistry of this resulfurized steel readily provides the machinability needed for the final, critical "backing-off" operation in making hobs. It doesn't tend to tear or produce rough finishes—as non-sulfur-bearing steels of this type so often do.

REX M-2-S costs about 30% less than T-1 type too, because it's lower priced per pound, and provides 5.4% more linear feet per pound.

Crucible REX M-2-S is also equal in red hardness to the T-1 type and even more resistant to abrasion. It's also tougher than any other tungsten type high speed steels, and hardenable over a wider range than any other molybdenum high speed steels.

Qualities like these make REX M-2-S extremely suitable (and economical) for broaches, chasers, lathe tools, reamers, taps and hobs as well as other tools normally requiring high speed steel.

For further information, just ask for details on REX M-2-S—or all the Crucible high speed steels today. Write: *Crucible Steel Company of America, Dept TJ08, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

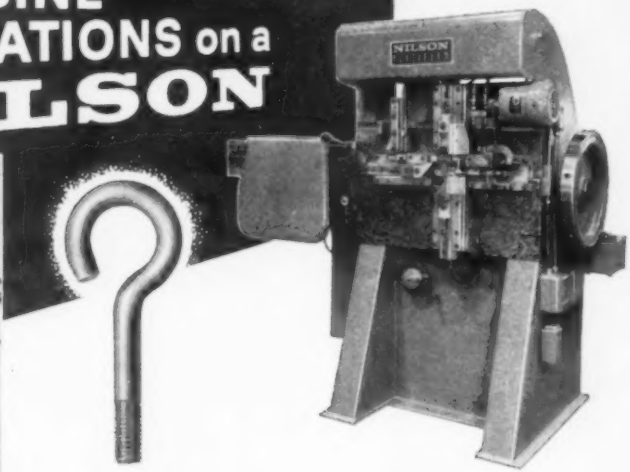
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NILSON 4-SLIDES

FORMING PRODUCTION PROFITS... *Automatically*

COMBINE OPERATIONS on a NILSON





Wire and ribbon metal forms involving secondary operations can be produced at minimum cost on Nilson 4-Slides. You can combine stamping, welding, metal cutting and sub-assembly operations with the basic forming cycle . . . eliminate the need for expensive, single-purpose equipment.

The Nilson "Vertiform" shown above, for example, has a die head mounted on the right-hand forming slide. Wire stock is straightened, cut off, formed and threaded—all automatically in one cycle!

In addition to the new "Vertiform," Nilson builds 17 models of horizontal 4-slides, including 5 ribbon metal machines with built-in press units. For a new approach to low-cost production of wire forms and small metal stampings, it will pay you to get in touch with Nilson.

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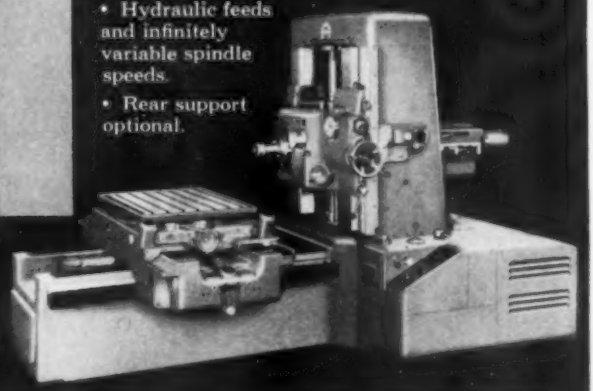
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PLUS...

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Measurement in inches)

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.

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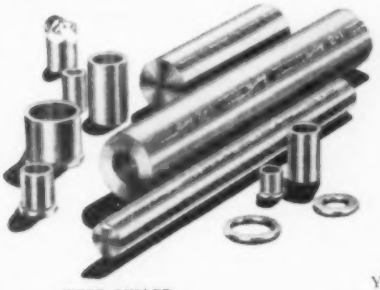
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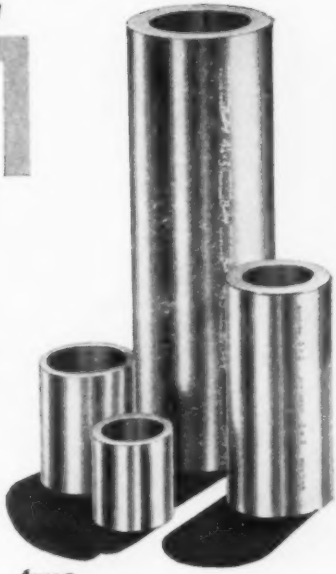
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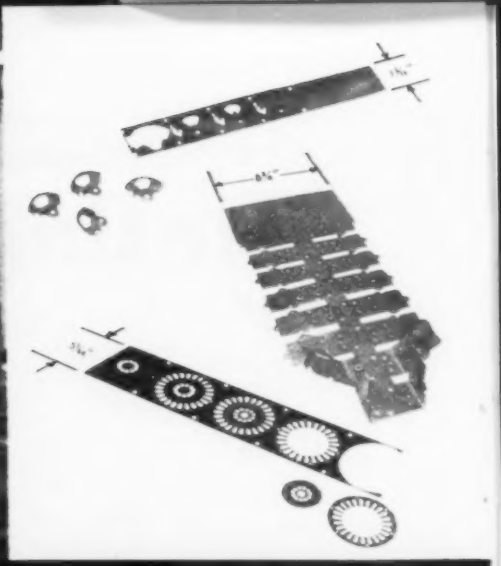
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Run your progressive dies at their top speed in a Piece-Maker

A Minster Piece-Maker press will deliver the maximum productivity from your progressive dies. That means more profit for you.

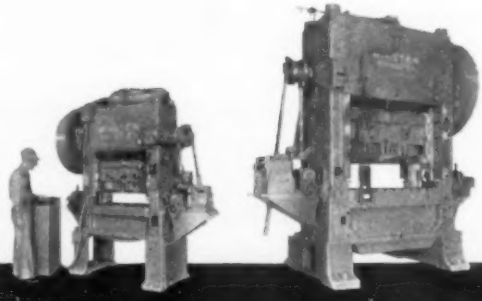
A 100 Ton Piece-Maker (like the one shown above) will run efficiently at the highest speed at which any blank, notch, pierce, draw or cut-off progressive die can be run (150 to 300 spm are not uncommon) . . . and do it with real accuracy.

The precision-built Minster Piece-Maker automatic production press has the stability to run continuously, giving you the best possible die performance and longer life for expensive progressive dies.

With a Minster you get all the economies of automatic production and, equally important, you get the experience of Minster application engineers who help you match the press to the job.

Are you taking full advantage of automatic production? Let your Minster representative tell you more about the Piece-Makers.

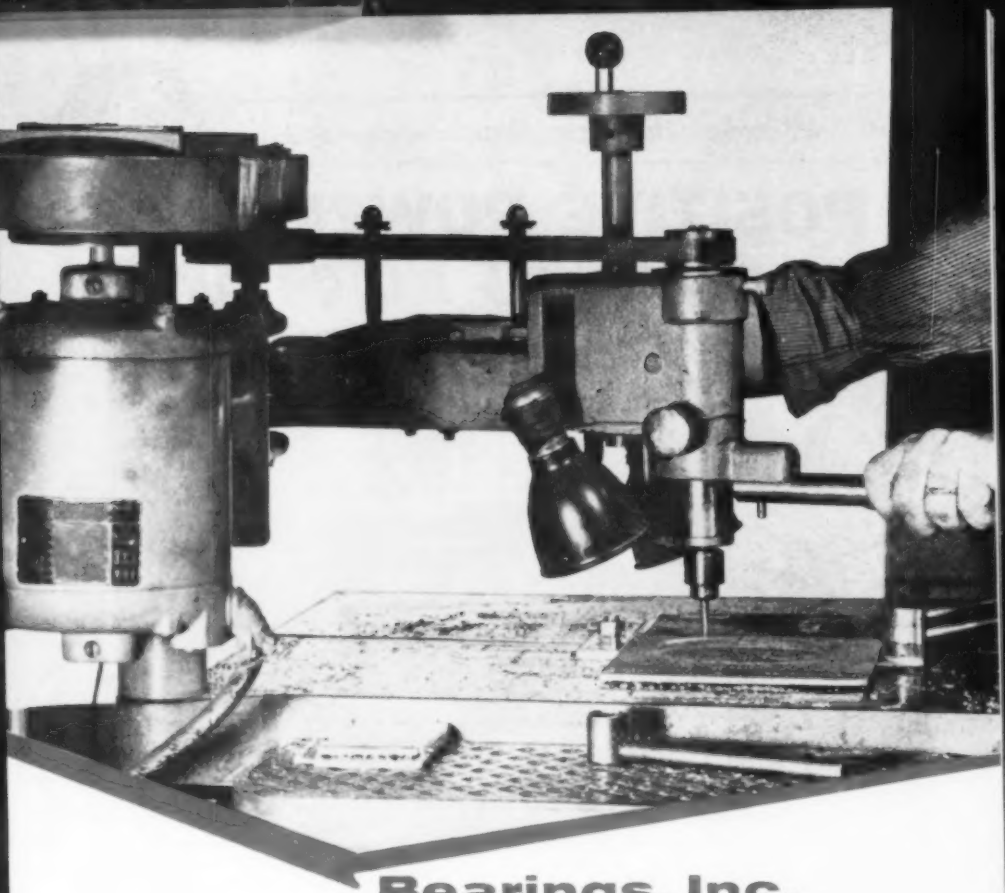
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repaired, serviced and returned this high speed spindle in just 48 hours!

—And we can give *you* this kind of service when you need it! This is a spindle on a router operating at 10,000 R.P.M. Its super-precision bearings were failing and the spindle would no longer perform satisfactorily.

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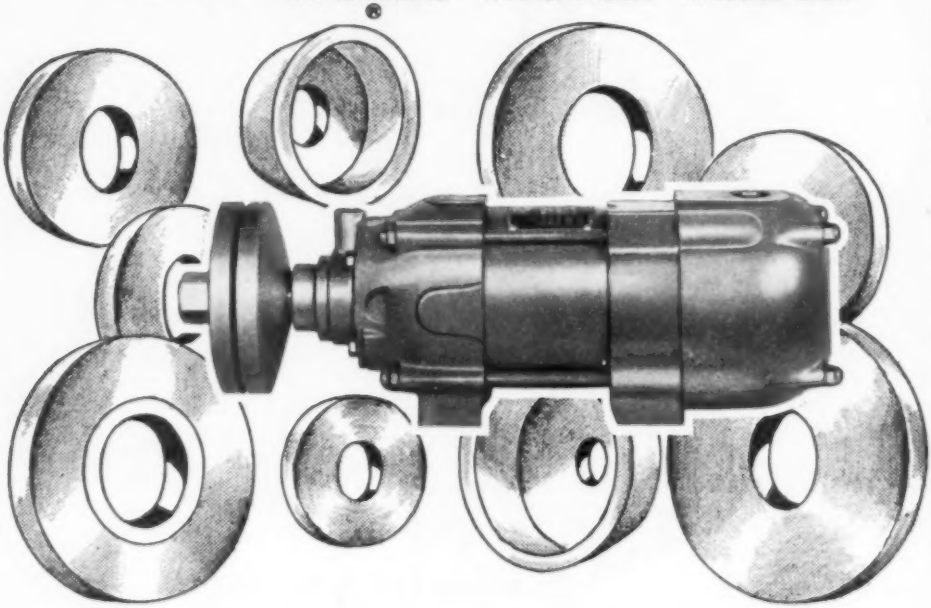
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CIMCOOL **S2 Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

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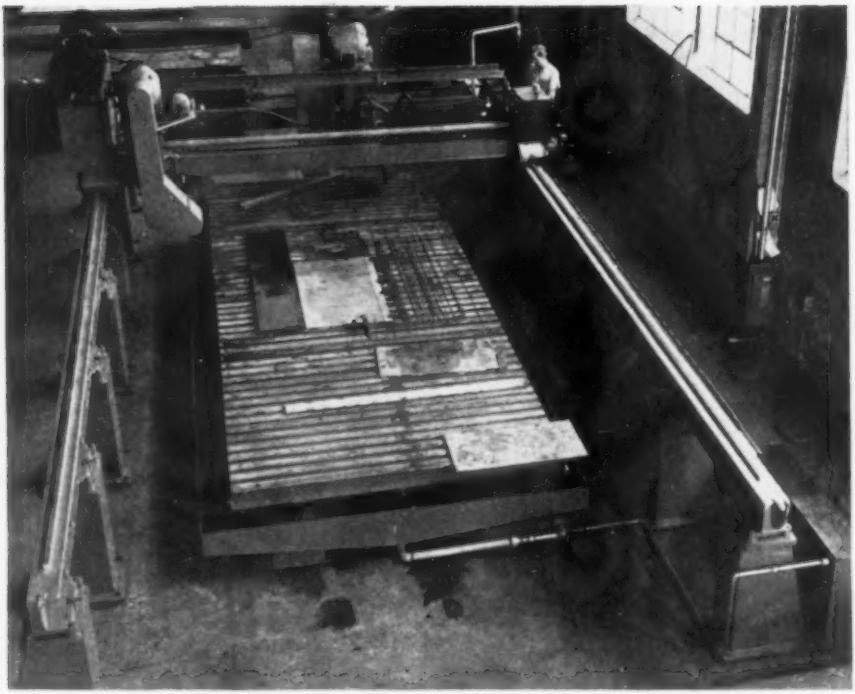


for 100% of all metal cutting jobs. The Answer is Pink!

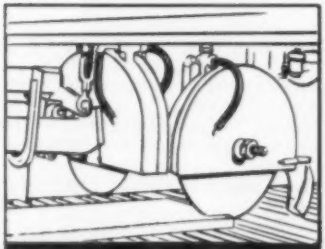
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High Speed Saw Makes Accurate 25 ft. Cuts on Plate Stock for Chicago Warehouse



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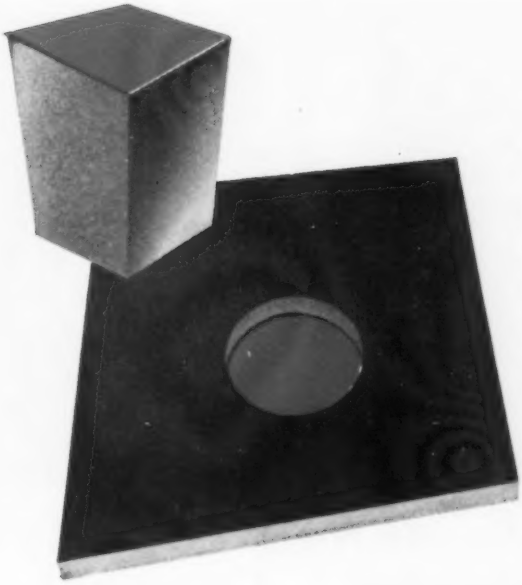
New 122-CX saw now in operation at Chicago Steel Service Company features 2 saws set at 90° angles. Cross cut has 10′ travel, ripping saw has 25′ travel . . . both cut to desirable tolerances . . . smooth, unbroken edges need little or no finishing. Can be used for wet or dry abrasive cutting. Ty-Sa-Man makes hundreds of types of metal-working saws, cut-off, long cut, mitre, friction, abrasive or combination. Send us your metal-cutting problems.

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Ace Drill Bushings are made right . . . to wear right. They guarantee a maximum concentricity of .0003" t.i.r. . . . usually it is far less. You can depend upon ACE Drill Bushings. They are consistently **the best** in every way. **Always specify ACE!**

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Does anyone expect perfect teamwork between a straight drill and a ( ) barreled out or a) (bell-mouthed drill guide? Of course not! That's as inconsistent as looking for close tolerance between a square peg and a round hole.

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Visit our operating exhibit, Booth 936, Cleveland Metals Show, October 27-31, 1958.



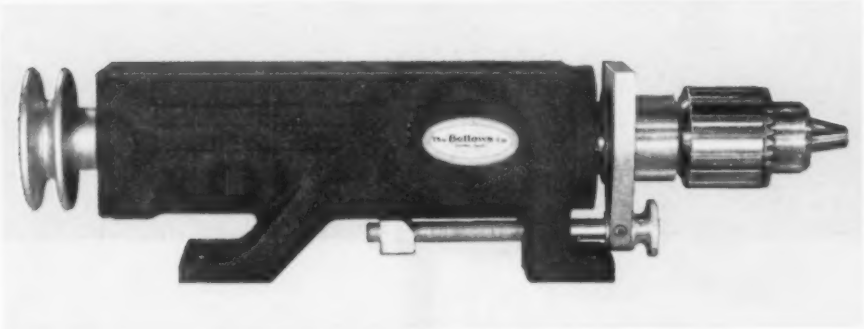
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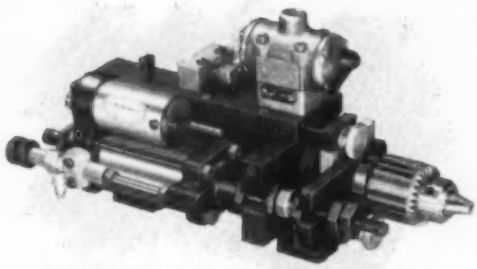
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**As illustrated less chuck and pulley.*



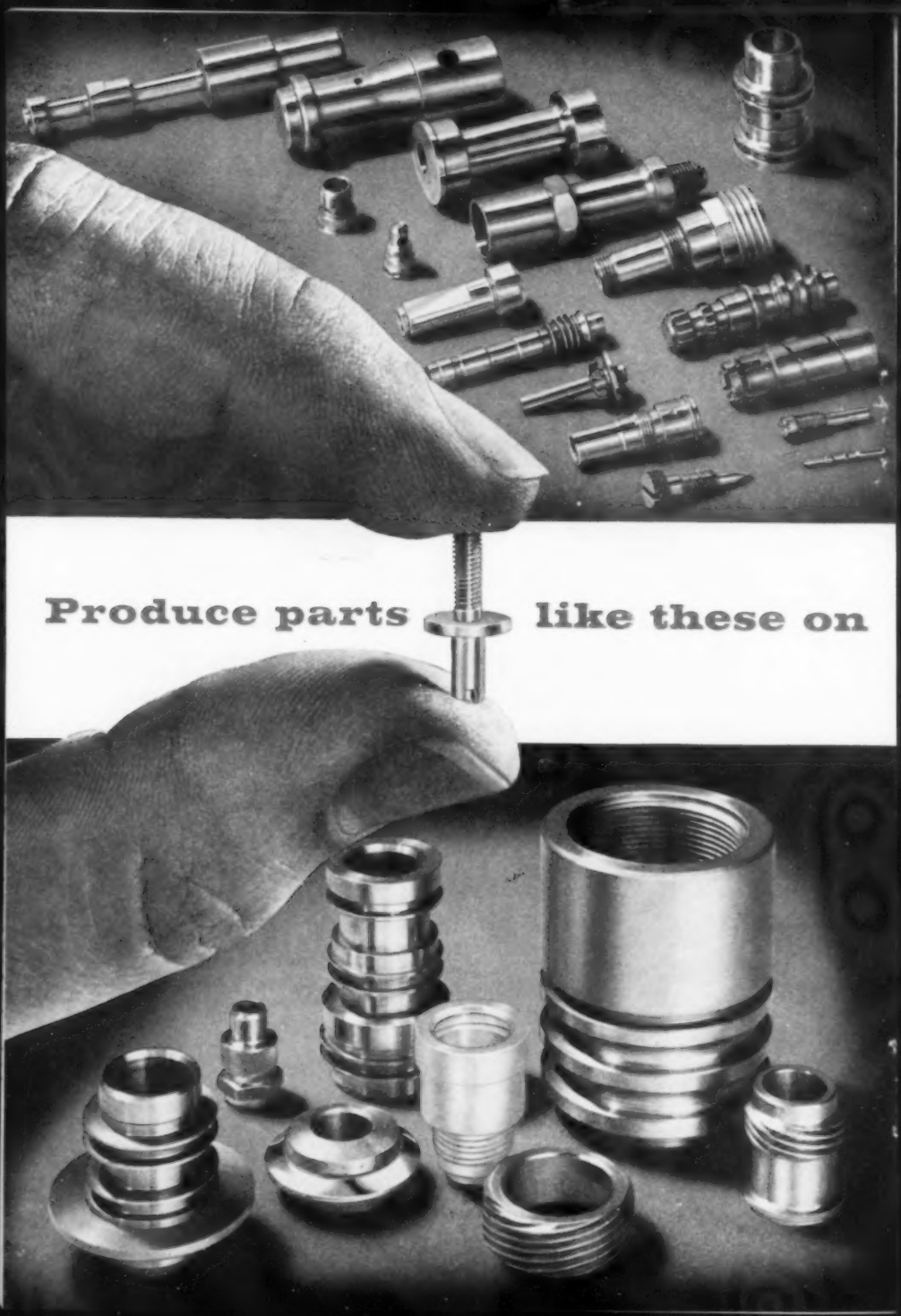
Model 22A Drill Head with optional "Hydro-Check" and "Electroaire" Valve Assembly

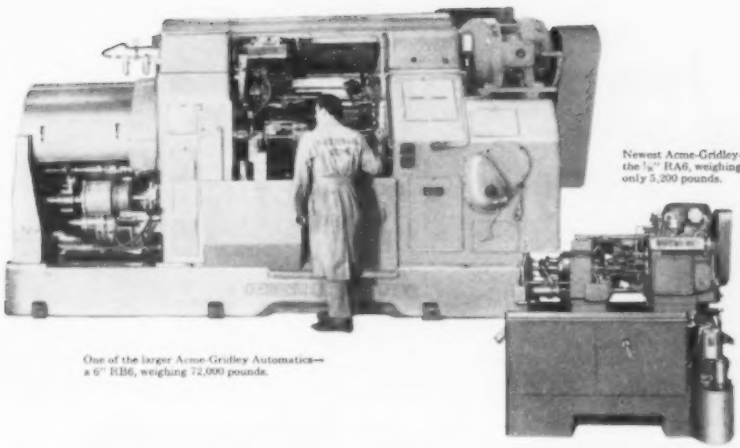
Write for Bulletin BL-22. Address The Bellows Co., Akron 9, Ohio, Dept MTB-1058. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18.

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One of the larger Acme-Gridley Automatics—a 6" RB6, weighing 72,000 pounds.

ACME-GRIDLEY automatics...

FORGET SECONDARY OPERATIONS!

Most parts machined on Acme-Gridleys are *completed* on Acme-Gridleys. Using these Automatics, you eliminate costly rehandling and, in many instances, avoid a sizeable second-machine investment.

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If you produce parts like the ones illustrated, then Acme-Gridley Automatics must be in your present plans. Our representative can give you expert assistance without obligation.

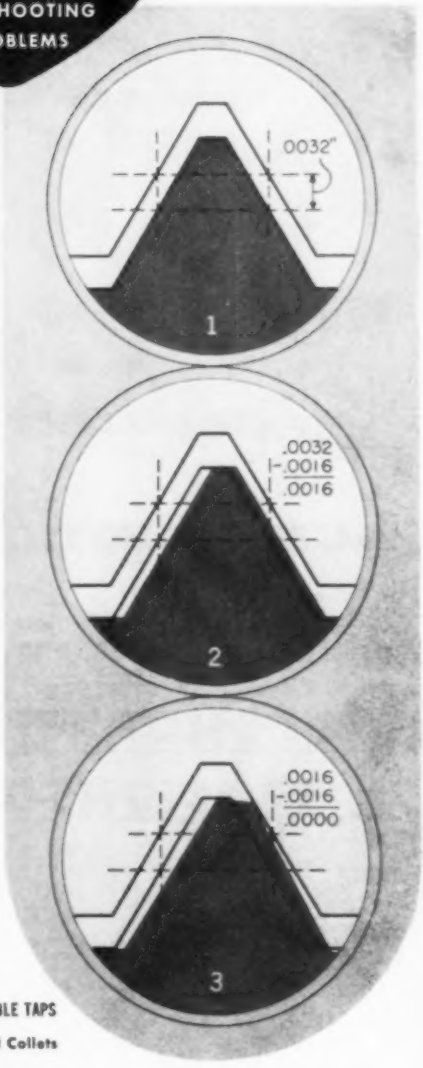
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TROUBLE-SHOOTING
THREADING PROBLEMS

lead error



WHAT IT COSTS

Lead error is bad enough by itself. But, when combined with other factors, it's worse. For instance, consider what happens to this 3/4-16 Class III thread.

Chart 1. shows a good thread which allows the full tolerance of .0032" on the pitch diameter for chaser wear. The same thread is shown in chart 2., but this time with a slight lead error of .0009" in 3/4 of an inch of thread length. *The working tolerance is now cut in half.* Chart 3. shows what happens when just a fifty-nine second (less than one degree) flank angle error is added to that small lead error. *There now is no working tolerance left.*

From this simple illustration, it is evident that the closer you can maintain lead and flank angle, the more size adjustment you have left for chaser wear. In other words, perfect lead and thread form present maximum provision *for better threads at lower cost.*

HOW TO PREVENT IT

Lead and thread form error are never a serious threat with J&L threading tools. Here's why:—

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3.) The non-cutting teeth on the chaser form a precision lead nut to lead on to the work.
4.) The die head has the rigidity and "beef" to hold the chasers in proper position in spite of cutting pressures.

OUR OFFER

We solve threading problems. May we tackle some of yours? Send them in—no obligation.

TANGENT & RADIAL DIE HEADS • COLLAPSIBLE & SOLID ADJUSTABLE TAPS
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Self-opening Stud Setters • Modern-Magic Chucks and Collets
Precision Boring Machines

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THREAD TOOL DIVISION

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Lodge & Shipley POWERSHIFT PRESELECTOR

GIVES PRODUCTION PLUS

- **TIME SAVING** • **INCREASED TOOL LIFE** • **FINER FINISH**
- **DECREASED EFFORT AND ERROR** • **PROVISION FOR THE FUTURE**

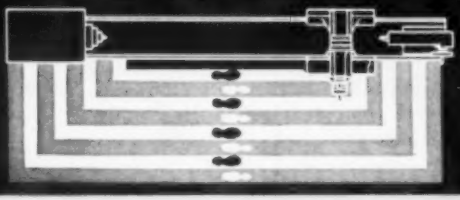
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A SINGLE DIAL . . . COMPUTES! REMEMBERS! SHIFTS! You merely rotate cut speed dial to desired speed (dial computes speed if desired) . . . then, when preset speed is needed, shift to it immediately at the apron! • One speed can be preset; up to six others "programmed" with handy indicator tabs. A Lodge & Shipley representative will be glad to explain fully. You'll find his name in the telephone yellow pages. Or, for detailed literature, write:

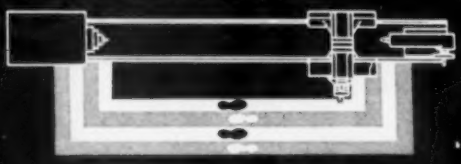
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CONVENTIONAL HEADSTOCK . . .
4 trips to headstock . . . 4 to apron



POWERSHIFT PRESELECTOR . . .
only 2 trips to headstock . . . only 2 to apron!



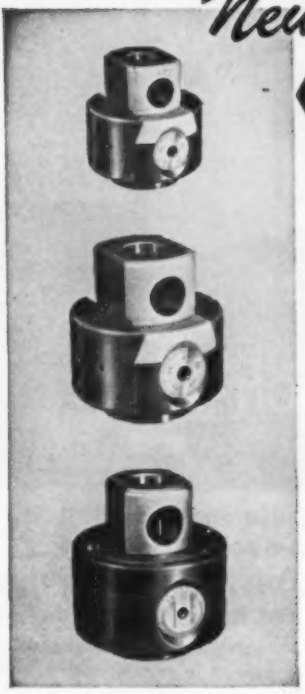
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WITH THESE OUTSTANDING FEATURES

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Cross-hole for greater range
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NEW 3" DIAMETER MODEL #203
INCLUDES THESE ADDITIONAL FEATURES

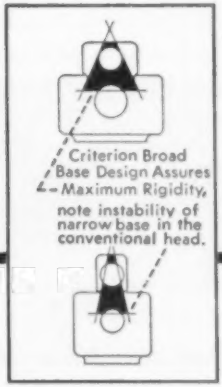
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THESE NEW HEADS TAKE ½" or ¾"
SHANK BORING TOOLS AND BORING BARS

RUST-RESISTING BLACK AND
SATIN-CHROME FINISH

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¾" in 3" dia. model
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CRITERION BORING HEADS are better because they combine utility with simplicity of design — see sketch to the right for one of many features.





Consult your Criterion Dealer or write for free literature.

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Diameter	Thickness
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combines...

RELIABLE RELEASE

at the right torque every time...



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right-hand taps only

with FRICTION-FREE overrunning roller drive

PROLONGS TAP LIFE—Gives you reliable release... precise control over torque. Releases instantly and completely below break strength of the tap. Preset torque release remains constant because sliding friction and heat are eliminated.

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Features in This Issue

MACHINE AND TOOL blue book

What you Should Know about the Design and Manufacturing of Fine Pitch Gears.... 99

Research in Russia—Cooling of Cutters by Heavy Pressure Stream 104

For Speed and Accuracy in Making Deep Holes—Gun Drilling 112

Fine Pitch Gears. First of a series on the design and manufacturing of fine pitch gears by Harry Devine is designing the blank. Mr. Devine discusses all the important factors to consider. The important things to consider are its location to its unit design together with the possible cutting action on a gear cutting machine. ....**Page 99**

Cutter Cooling in Russia. A special comprehensive analysis of the influence of different cooling methods on the durability of the tool, the cutting forces and the temperature was made by Russian engineers in the laboratories of MAMI and at the Lickachev automobile plant. These tests were made under practical operating conditions. ..... **Page 104**

Gun Drilling. A very comprehensive report which proves that gun drilling is capable of producing phenomenal results. It is especially phenomenal in both speed and accuracy in deep holes, such as are required in artillery pieces and in aircraft hydraulic gear. It is in these instances where depth of hold is extraordinarily deep and trueness must be held to even more extraordinary limits. ..... **Page 112**

Molding Electric Plugs and Connectors. To perform the job of molding electrical plugs and connectors with uniformity, Beckley Electric Co. installed a versatile hydraulic press. .....**Page 126**

Electro-Chemical Machining. Here's significant advancement in the art of electrical machining. Elox announces this new method as a companion to their present electrical discharge machine process. The heart of the new method is the electrolytic action on the workpiece .....**Page 129**

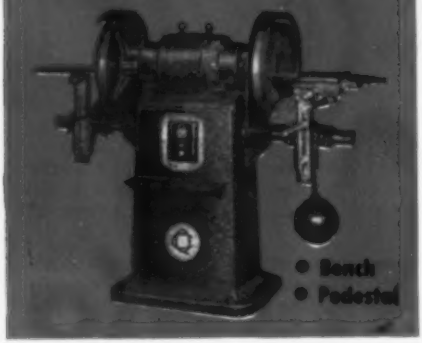
New Ford Engine Plant. The new Ford engine plant in Lima, Ohio, has automated lines which feature quality control. . .....**Page 141**

Materials Handling. By solving its own materials handling problems, R. G. LeTourneau, Inc., discovered it had a new line of commercial products, jib cranes, hoist cranes and bridge cranes. ....**Page 157**

Heat Program Timer. The problems associated with the resistance welding of small assemblies, such as are commonly encountered in tube manufacturing, can be solved by a new small and compact heat program timer. .....**Page 162**

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Meetings

Oct. 13-15—National Electronics Conference, Hotel Sherman, Chicago, Ill. For further information contact Program Committee Chairman, Mr. L. W. Von Tersch, Electrical Engineering Department, Michigan State University, East Lansing, Mich.

Oco. 15-17—American Machine Tool Distributors' Association Annual Meeting, Sheraton Plaza Hotel, Boston, Massachusetts, sponsored by the Association, 1900 Arch Street, Philadelphia 3, Pa.

Oct. 16-17—National Conference on Industrial Hydraulics, Hotel Sherman, Chicago, Illinois, sponsored by Illinois Institute of Technology and Armour Research Foundation.

Oct. 27-31—National Metal Congress & Exposition, Public Auditorium, Cleveland, Ohio, sponsored by American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio.

Oct. 28—Ultrasonic Mfgs. Assn. Annual Meeting, Hotel Cleveland, Cleveland, Ohio. Association Headquarters: 271 North Ave., New Rochelle, N.Y.

Oct. 29-30—Computer Applications Symposium, Morrison Hotel, Chicago, Illinois, sponsored by Armour Research Foundation.

Oct. 29-31—Metal Treating Institute Annual Meeting, Hotel Cleveland, Cleveland, Ohio. Association headquarters: 271 North Ave., New Rochelle, N.Y.

Nov. 5-9—National Tool & Die Manufacturers' Association, Annual Convention, 907 Public Square Building, Cleveland 13, Ohio, at the Sheraton Hotel, Philadelphia, Pa.

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The June 1958 issue of MACHINE and TOOL BLUE BOOK, on page 94, contained some reference to surplus machine tools, tools which might be made available to state and local educational institutions.

Our Department is moving into a new laboratory building within a few months, and we could very easily use some of the pieces of equipment mentioned in this announcement.

Would you please let me know how we should go about requesting some of this equipment?

Gerald Nadler, Dept. of Ind. Engineering
Washington University, St. Louis, Mo.

We suggest you contact Mr. H. B. McCoy, Administrator, Business and Defense Services Administration, U.S. Dept. of Commerce, Washington 25, D.C.

American Built Machine Tools

The February, 1954 issue of MACHINE AND TOOL BLUE BOOK contains a "Special Report No. 37 — Grinding Machines Part II."

We are interested in obtaining the complete series and would like to know if they have been printed in book form.

MRS. SARA T. MOXLEY,
TECHNICAL INFORMATION FILE
MANUFACTURING ENGINEERING
DIV. PLANT 2
GRUMMAN AIRCRAFT
ENGINEERING CORP.
Bethpage, L.I., N.Y.

This was a series of 12 parts, which is now incorporated in a book entitled "American-Built Machine Tools —Vol. II."

Contour Machines

We would appreciate receiving a copy, if available, of an article entitled, "Contour Machining of Fluid Drive Rotors" by H. A. Meyer, 10 October 1957, p. 138-143.

H. D. ALLERS,
ENGINEERING DEPARTMENT
WATEROUS COMPANY
St. Paul, Minn.

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We are an established firm of manufacturers in Johannesburg, South Africa. Our principal products are generator and starter armatures and field coils for the automotive trade.

I read with interest your articles in Volume 52, No. 9, which I picked up whilst on a business trip to the U.S.A. on "Forming Coils Faster," and "Tooling for Plastic Insulated Commutators."

We manufacture our own commutators—mica insulated.

I wonder if you have any back numbers dealing with any phase of our work?

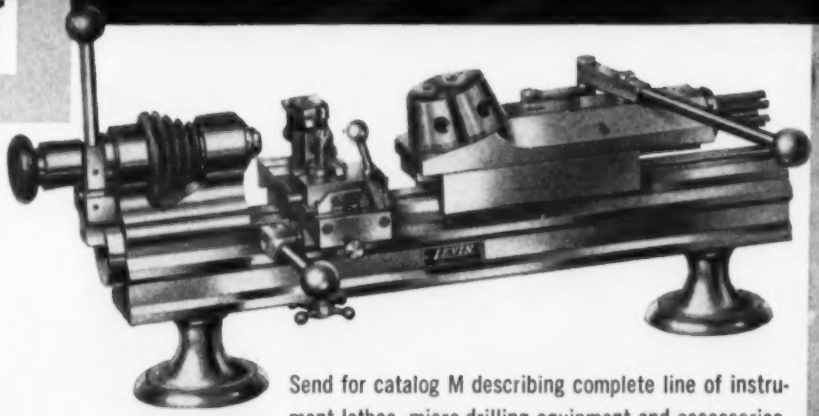
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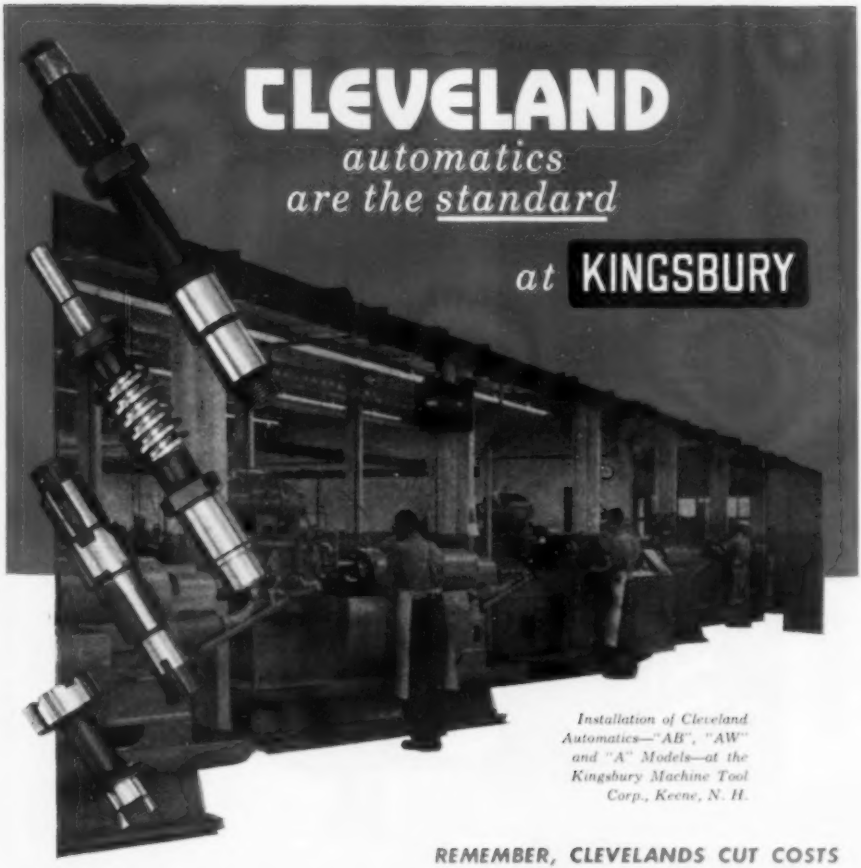


A small precision turret lathe for second operations and production of instrument parts. Available in two collet capacities, 5/16" or 3/16". The 6 position turret is self indexing and has hardened ways. Turret holes are 1/2" diameter. Turret travel 1-5/8". The cross slide has a swivel side at one end and a rigid tool block at the other. Lever collet closer provides quick opening and closing. A variety of turret tools with 1/2" shanks is available.

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Installation of Cleveland Automatics—"AB", "AW" and "A" Models—at the Kingsbury Machine Tool Corp., Keene, N. H.

REMEMBER, CLEVELANDS CUT COSTS

The Kingsbury Machine Tool Corp., Keene, N. H., has *standardized* on Cleveland Single Spindle Automatics for their screw machine department. The Clevelands are used to blank out many of the component parts for the high production indexing automatic drilling and tapping machines which they build. Shown above are four finished parts which were originally blanked on Clevelands. Many other parts are machined complete on Clevelands.

Clevelands were selected for this work because they combine a wide range of multiple-tooled operations with quick set-up and easy control. These Cleveland qualities assure fast, accurate and low-cost production on both long and short runs.

If you produce any parts requiring turning, forming and end-working operations, you'll profit by giving Clevelands a full investigation. Call in a Cleveland sales engineer . . . or let us submit recommendations with production and cost estimates based on part samples or prints of your work. There is no obligation. For machine specifications, write for new General Bulletin describing the line of Clevelands.

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Special Benefits for Small Business

The tax provisions of the new law to provide special benefits for small business will be tested by experience in the months ahead. This law which was designed to stimulate small business buying of needed new equipment—liberalization on depreciation allowances for tax purposes—is said to be already bearing fruit. New lending agencies to provide long-term money have sprung up in many areas.

For complete information about the new law, write to: Small Business Administration, Washington, D.C.

What Effect Pay Raises?

Washington economists are disturbed by the possible effect of automatic pay raises in long-term contracts. They are keeping close watch on current labor-management negotiations, as they believe that the inflationary effect of Federal budget deficits will be minor compared to the impact of pay increases.

The big worry, of course, is that increased pay raises bring additional price increases, which in turn changes the plans of potential buyers. This would deal a blow to business recovery.

Campaign Issues

Considering that this is an election year, it is believed that a new high in bipartisan cooperation was achieved during the 85th Congress. This cooperation hasn't deprived either party of issues in the coming campaign. The Republicans will accuse the Democrats of adding to inflationary perils, killing hopes of a tax cut and will claim credit for increasing the prosperity of the farmers. The Democrats will be critical of administration policies in the Middle East. If there is a slight interruption in the continued improvement in business, the Democrats will go strong on accusing the Republicans of prolonging the recession.

Foreign Aid

Although the $3.3 billion for U.S. foreign aid approved by the 85th Congress was $600 million less than President Eisenhower requested it is expected to be adequate, unless the Arab plan for economic de-

continued

velopment in the Middle East needs implementation.

Outer Space—Who Will Own It?

It is said to have been decided that if the U.S. is the first country to send a rocket to the moon, we will not claim ownership of this satellite. Foreign policy makers, who have been pondering over what steps to take to avoid conflict with Russia over ownership of outer space, are said to believe that such an expressed attitude would prompt Russia to show the same restraint if it is the first to reach the moon's surface.

Tax Policy

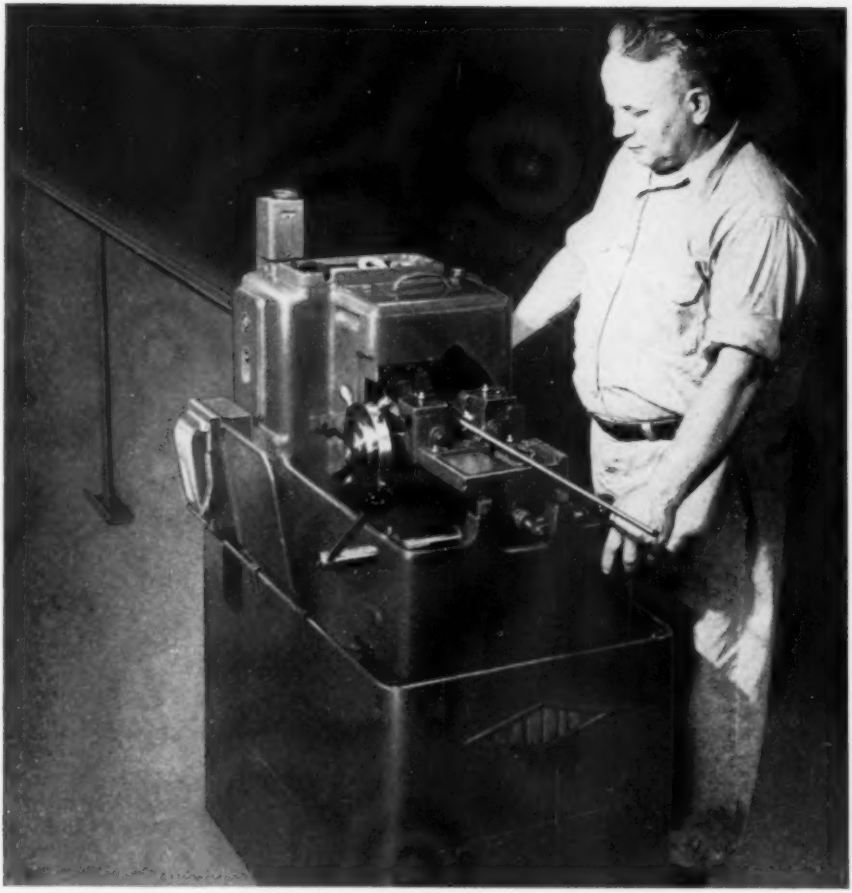
Concensus in Washington is that the chances for a general reduction of income tax rates before 1960 appear to be nil. However, Treasury Department tax experts are giving much thought to easier tax treatment for retirement plans of the self-employed and more liberal depreciation allowances in some cases to business. All the thinking is supposed to be concentrated on what will do the most good for a dynamic economy.

By 1960, it is anticipated that the national economic recovery will reach proportions so that the budget can be balanced with enough left over to consider a general tax cut.



Hundreds of thousands of Americans should take immediate advantage of the open door to Russia before it is slammed. In Moscow, I asked American Ambassador L. E. Thompson . . . if the average American tourist in Russia was a good ambassador and if he would encourage even more to come. He said Americans in Russia, on the whole, were doing a splendid job of representing the United States. He would like to see Americans come in tens of thousands. Every bit of fresh air from the free world helps a little! . . . With all my heart, I urge Christians to go, to offer true friendship, and to plant a spiritual seed that may flower in miraculous proportions.

Dr. Bob Pierce
President, World Vision, Inc.



THREADING AT 581 R.P.M.

Suburban Industries, Bensenville, Ill., is achieving these results with a LANDMACO 5C Threading Machine equipped with a 5/8". VVV LANCO Hardened and Ground Die Head. Both steel studs and continuously-threaded bars are produced at 581 r.p.m.

Chaser life is excellent. For example: 10,000 studs of B 1113 steel, having a 1/2" UN thread 3/4" in length, are produced between chaser grinds. In the rod application, with 1/2" 13 pitch UN threads in 12-foot lengths, 150 bars of B 1113 steel are produced between chaser grinds.

The 5C LANDMACO Machine is manufactured in a single-spindle model for threading all diameters from 3/16" to 5/8" to Class 4 fit. Lead screw and air-operated equipment available to increase machine efficiency. 519

LANDIS *Machine* COMPANY

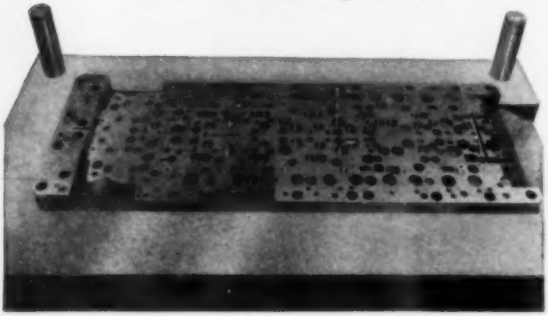
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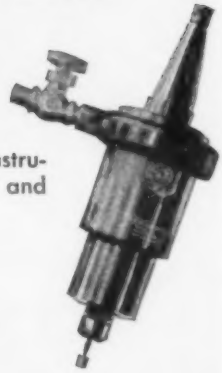
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BENCO COLLET MANUFACTURING CO.
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Developing Respect for the Blue-Collar Worker

Secretary of Labor Mitchell and Secretary of Health, Education and Welfare Flemming made last minute appeals to high school students to give up their summer jobs and return to school and shape their courses for college careers. It is fine that local industry groups will be asked to cooperate in providing special guidance and counseling for students who have shown scholastic ability but have planned to discontinue their formal education. But as Secretary Mitchell points out in a recent article the shortage of expert "blue collar" workers is very critical.

With our metalworking industry becoming more complex every year, the shortage of skilled craftsmen of the blue collar class is becoming more acute than the shortage of engineers.

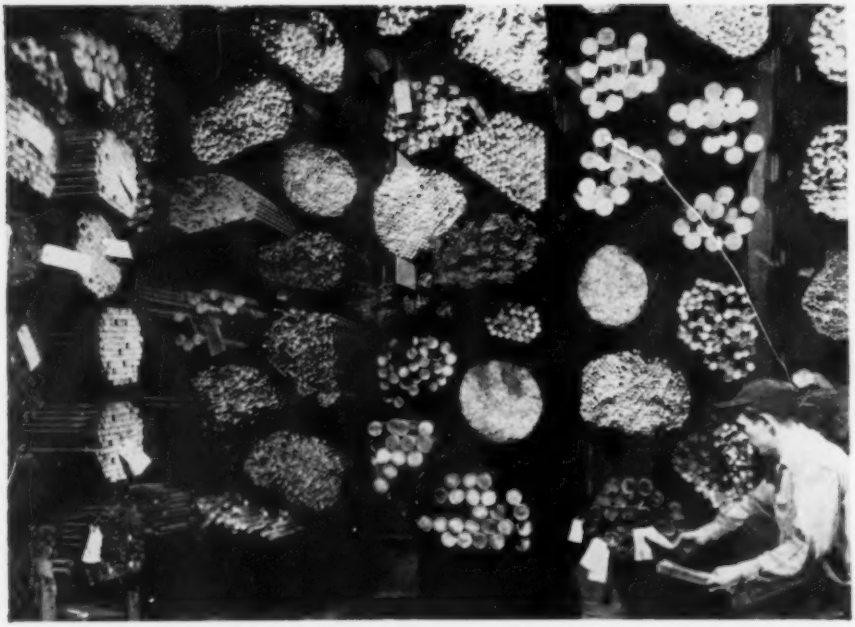
It is important that effective techniques be created to pick the type of young man who can work with both his hands and his head. It is very noticeable when visiting metalworking plants that so many skilled technicians are in their fifties. Between 1951 and 1956 one survey pointed out that the number of skilled craftsmen under 25 years of age dropped 28 percent. The President's Committee on Scientists and Engineers reported that U.S. schools are graduating less than one-sixth the required number of highly skilled scientific and engineering technicians through accredited or approved courses.

There is considerable prestige in being known as the graduate of an engineering college. If there is less social status connected with the skilled technician, it is because people have gross misconceptions regarding what modern industrial work is like.

Industry spends freely to advertise with large display ads for technicians and engineers. A year ago one company would try to outdo the other in the scope of their recruitment activities for engineers. Why couldn't the public relations and advertising boys get together and do something about eradicating the prejudice against the blue collar worker? The job is no more than showing that the type of worker that is really in demand today is not a blue collar man at all. Skilled technicians in manufacturing plants today wear sport shirts. Their work is highly skilled, they are well paid and their future is secure.

Above all, the mama's and papa's who want junior to choose a vocation where he can dress nice should be shown the true picture of what the life of a skilled technician is like.

PAUL A. MELINE
Managing Editor



3-Point Check List

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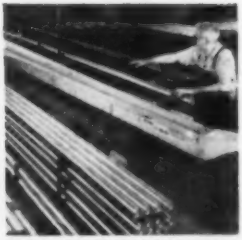
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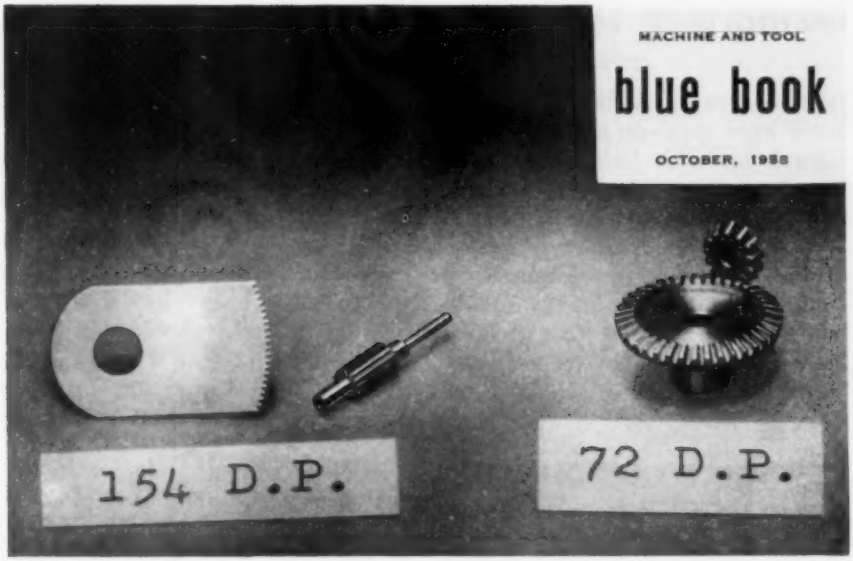
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MACHINE AND TOOL
blue book
OCTOBER, 1958



What you should know about the design and manufacturing of . . .

Fine Pitch Gears

Part 1—Designing the Blank

By **Harry A. Devine**
Chief Engineer
Beaver Gear Works Inc.

• The manufacture of fine pitch gears requires different techniques than for manufacturing coarse pitch gears. The first requisite is to design the blank properly in order to secure the specified tolerances on the finished gear. Holding the gear blank properly when cutting the teeth is of the utmost importance. Problems of holding fine pitch gears are much more complicated than that of holding coarse pitch gears. Some gears are driven by a serrated driver, others by collets, and some are held on arbors. Whatever method is used, it must be a positive drive and must not injure the gear blank.

A simple form of gear has an outside diameter, a hole, and flat sides, Fig. 1. Other forms consist of cluster gears with two or more gears on one blank. Others have

gears and cams on the same blank. Some have gears on shanks. Others have holes with hubs, etc. These forms create problems for holding the blank while cutting the teeth and should be considered in the original design of the blank.

Material for gear blanks should be selected to give the greatest amount of service in its end use. Some materials are selected for their weight characteristics if the gears go into airborne units. Some are selected to give the greatest wear; a great many must be hardened. Where noise is a factor, gear blanks can be made from phenolic or nylon materials. Where gears are to carry heavy loads, a great deal of thought should be given to the material that is to be used. Material that is used for very fine pitch gears cannot be too hard.

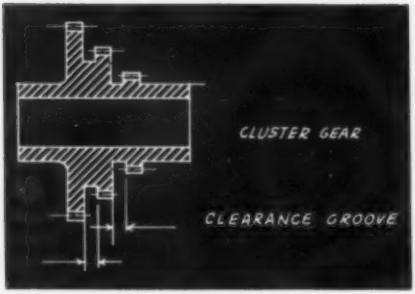
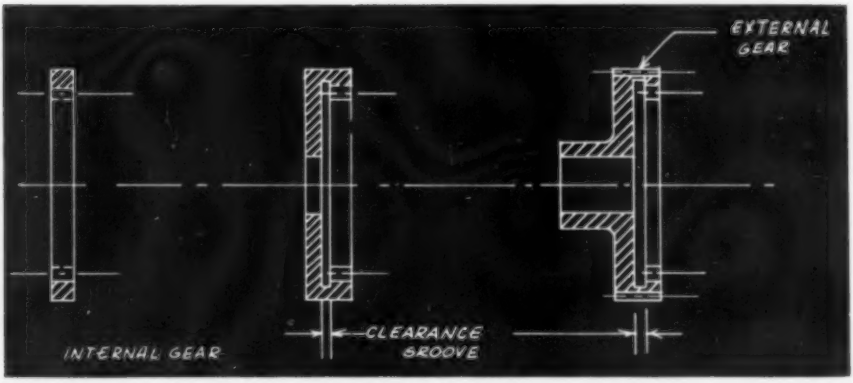


Figure 1

Another important factor in the design of a fine pitch gear blank is the location of the gear or gears on the blank, such as cluster gears. If gears are placed too close together or too close to a shoulder, enough space should be allowed between the gear faces or shoulder for cutter clearance as the teeth in this type of gear must be shaped.



Figures 2, 3 and 4

If the location of these gears on the blank cannot be spaced for cutter clearance, it may be possible to make the gear in more than one piece and then assembled into a unit after cutting the teeth. Consideration must be given to deburring these cluster gears. Sometimes a large burr is thrown between the two gears or shoulder and the burring becomes a very difficult and expensive problem. In certain designs, one gear is large enough to be hobbed and the adjacent gear, being smaller, must be shaped. In all cases, however, the design must allow for run-by for the hob.

The above information pertains particularly to spur gear blanks. When other forms of gear blanks are made, such as helical or bevel, the location is definitely limited. The helical gear is limited to the helix angle. If the angle is too large, the hob would run into the part nearest to the gear. Bevel gear blank design is limited to the holding in the generating machine.

Most internal gear blanks are designed to be held on the O.D. and the teeth cut so the cutter will follow through the gear, Fig 2. If the design is such that the gear has a recess, the recess must be large enough to allow the cutter to stop without hitting the other section of the blank, Fig. 3. The dimension of this recess is proportional to the diametral pitch of the gear. Internal gears can be placed on a gear blank with spur gears but must be on the end and have no

The Beaver Gear Works, founded on October 1, 1944 by its present President and General Manager, Chas. L. Kessler, enjoys a nation wide reputation for cutting fine pitch gears. Mr. Kessler's knowledge of gears and gear manufacturing has been recognized nationally by his election to the Board of Directors of the American Gear Manufacturers Association for several terms.

The Beaver Gear Works manufactures custom made precision gears as close at AGMA Precision Class 2 tolerances. The normal range of work runs from 20 D.P. to 300 D.P. In addition to manufacturing gears, this company manufactures small open-faced units such as tuning assemblies for transmitters. While specializing considerably in the production of gears for altimeters, air speed equipment and navigation instruments, Beaver gears are also to be found in TV, motion picture projectors, radio transmitters, record players, cameras, clocks, timing devices, radar equipment, gages, machine tools, scales, pumps, drills, and instruments of all kinds.

The Beaver Gear Works also maintains an engineering service for their customers.

The firm's copyrighted trademark is also unique. It features a beaver gnawing away on a worm gear.

Designing a hub or a bevel gear blank assists in balancing

obstructions to interfere with the cutter.

Some internal gear blanks are designed to have a spur gear on the O.D., Fig. 4. It is best to have a common hole so that each gear can be cut from this hole for pitch line concentricity.

Bevel gear blanks are generally designed with a hole and a hub, Fig. 5. The hub assists in balancing the blank as the thrust of the gear is angular. The hub also helps to hold the gear on a shaft. Some bevel gear blanks are designed to include other parts. It is best to have the bevel gear on the end as the cutting action is not always possible in the center, Fig. 6. Bevel gears are designed by ratio with its mate and the size of the gear will depend on whether it can be placed at a certain position other than the end.

The above information on the design of bevel gear blanks pertains to straight bevel gears only. The design of other types of bevel gears such as spirals, zerols, etc. should be referred to the manufacturer who is to cut the gear.

The important things to remember in the design of gear blanks are its location for its unit design together with the possible cutting action on a gear cutting machine. If the gear blank cannot meet both of these requirements, then the blank may have to be made in sections and pressed or silver soldered on a common hub or shaft.

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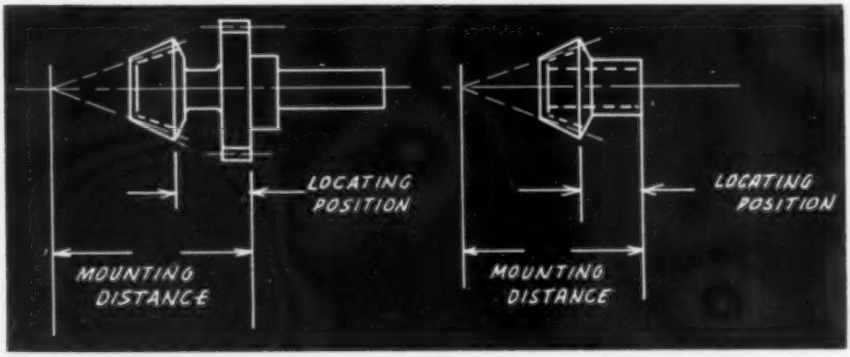


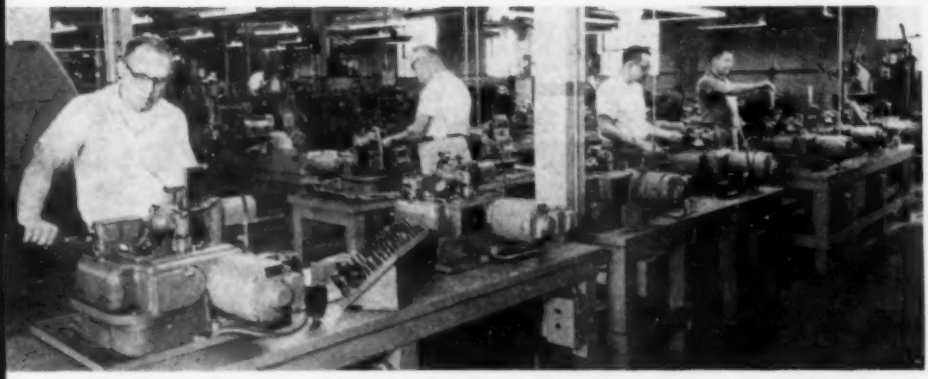
Figure 5

Figure 6

as thrust of gear is angular



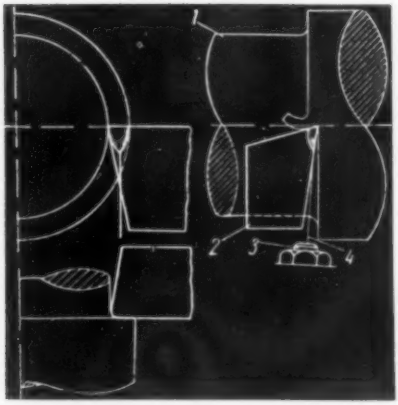
Fellows Gear Shapers.



Above: Barber-Colman small spur gear hobbers. **Below:** Gleason bevel gear generators.



Research in Russia



1. The coolant under pressure acting from the back edge. (1) the workpiece; (2) the cutter; (3) the nozzle, (4) cooling spray.

Cooling of Cutters by

In recent years a series of articles have been published in Russia on the efficiency of the cooling and lubricating systems operating on the back edge of the cutter under a pressure of 30 atmospheres or 441 psi. (Fig. 1) A special comprehensive analysis of the influence of different cooling methods on the durability of the tool, the temperature and the cutting forces was made by Russian engineers in the Laboratories of MAMI and at the Lickachev Automobile Plant, in practical operating conditions.

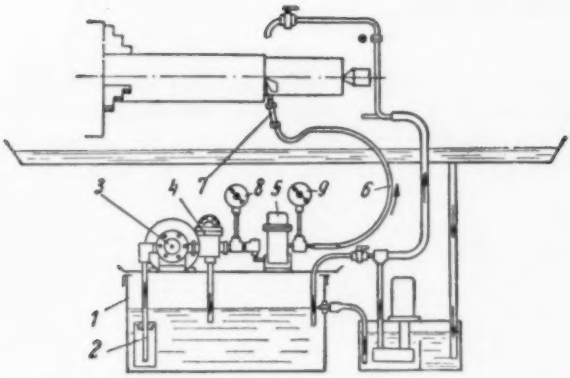
Translated from
The Mechanical Engineering News
December, 1957, Moscow, USSR.

• The tests described here were made on a long-bed lathe during the turning of standardized steel (alloy 18XGT), of hardness: D_b= 4.5 mm., on a polished surface; the cutters had a steel-faced blade (steel P18).

The geometry of the cutters was as follows:

End cutting edge angle–15°
Side cutting edge angle–15°
End and side relief–10°
Back rake–0°
Nose radius–.060-in.

The hardness of the cutters was 65 R_c. As a cooling medium a 5% solution of emisol (in water) was used. To get a high pressure stream a special apparatus was constructed which was attached to the regular



2. Special installation. Apparatus constructed and attached to the regular cooling system.

Heavy Pressure Stream

cooling system of a turning lathe. (Fig. 2) This apparatus has a reservoir (1); a gauze filter (2); a rotary pump (3); a pressure regulator (4); a laminated filter (5); a flexible hose (6); a nozzle holder (7); and 2 manometers (8) and (9) to control the coolant pressure before and after filtration. The actual consumption during the standard top sprinkling and the pressure jet cooling shower, 30 to 441 psi, from nozzles of different diameters (.0047-in. to .0788-in.) was determined by repeated measurements of the amount of liquid consumed in a unit of time.

The mean results of these measurements are shown in Fig. 3. The dependence of liquid consumption Q on the pressure in the activated system P for different nozzle diameters d is expressed in the equation:

$$Q = M\ 0.66d^2P^{0.5}. \quad (1)$$

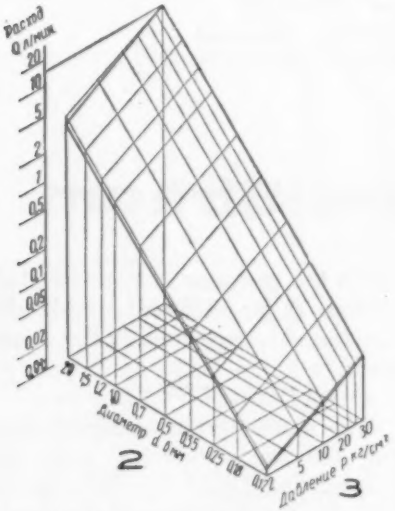
The consumption of liquid during the top sprinkling with the pressure at 0.0135 kg/cm² was 15 lit/min., the diameters of the pipe's outlet being 15 mm. or .591-in. The coefficient of liquid consumption M is found in the equation:

$$M = \frac{q_{fact}}{W\sqrt{0.2gP}}$$

where W is the cross-section of the nozzle in mm².

The nozzles with diameters of 0.12, 0.18, 0.25, 0.35, 0.5, 0.7, 1.0 mm. were chosen, taking into ac-

count the doubling of the size of the cross-sections of the mouthpiece. From the diagram in Fig. 3 and equation (1) it is clear that the change of the nozzle's diameter has a greater influence on the liquid consumption than has the change of pressure. The nozzle's diameter acts on the consumption in



3. The output (1) of the emulsion is dependent on pressure (3) and the diameter (2) of the nozzle.

power of 2, while the pressure acts on power of 0.5.

The durability of the cutters T was determined during the cutting depth t = .1182-in., the feeding s = .015-in. per rev. and the speed v = 4 ÷ 86 m/mm. It would be impossible to quote all the results of the tests in this article and Fig. 4 therefore gives only the results obtained during v = 53.3 m/mm. For these operating conditions the mean durability of the cutters during top sprinkling equals 2-3 minutes. During pressure jet cooling the durability is much higher, namely 12-46 minutes. Depending on the parameters of the cooling it increases from 5 to 20 times. The experiments have shown that the diameter of the nozzle d has little effect on the cutter's durability. Thus, the change of the diameter from .0047-in. to .0788-in. during the pressure of 29.4 psi produces an increase of durability from 12 to 14 min. and during the pressure of 75 p.s.i. there is an increase of durability from 18 to 22 min. The effect of the nozzle's diameter on the cutter's durability may be expressed by the following function:

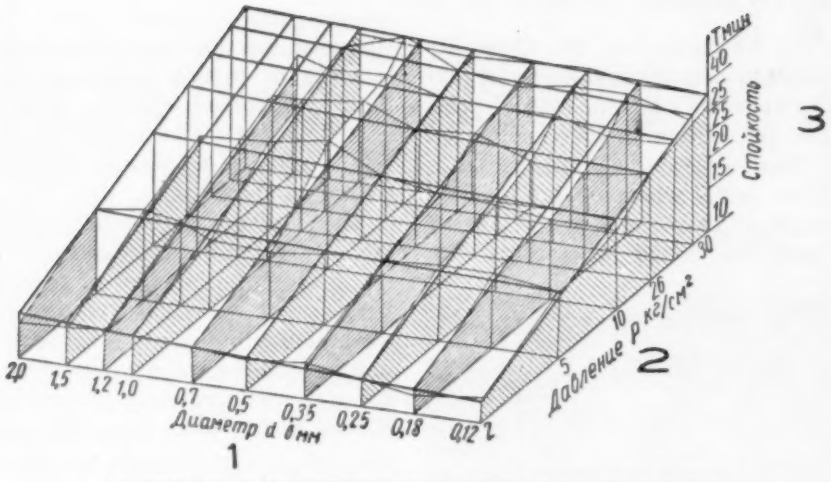
$$T = C_1 d^{0.1}$$

Because the diameter of the nozzle affects only the amount of liquid consumption, the effect of the emulsion consumption upon the increase of the cutter's durability

---

The importance of the consumption coefficient dependent on the pressure P is shown by the following figures:

P in kg/cm²	0.1	0.2	0.5	1.0	2.0	5.0	10	15	20	25
M	0.894	0.903	0.915	0.925	0.935	0.948	0.957	0.963	0.967	0.970



4. Durability of the cutters during pressure jet cooling shower. Different pressures and different nozzle diameters.

is likewise insignificant.

The change of pressure in the activated system has a decisive effect on the durability of the tool. If the diameter of the nozzle is .0048-in. the increase of pressure from 29.4 to 441 p.s.i. gives an increase of durability from 12 to 32 min. and if the nozzle's diameter is .028-in. it gives an increase of durability from 14 to 42 min. As shown in Fig. 4, this increase of durability may be observed during the operation with any nozzle diameter.

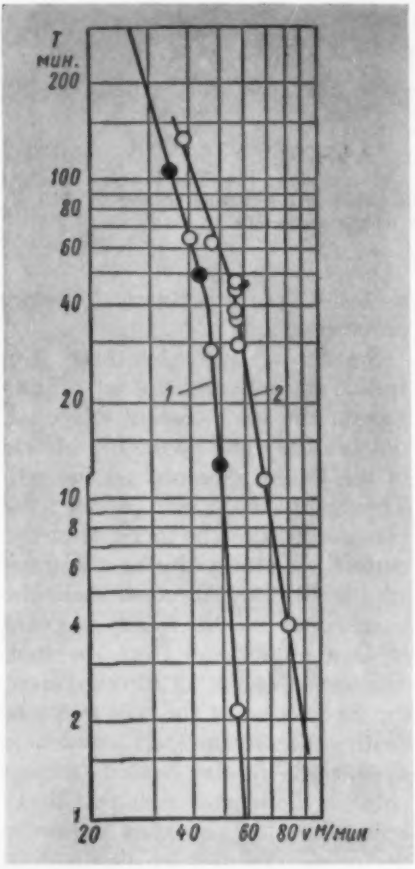
The fine continuous lines show the curves drawn through the mean values of durability, obtained for the diameter of each nozzle during the given emulsion pressure in the apparatus. The heavy continuous lines show the curves obtained as a result of experimental points processing.

Since during standard top sprinkling and pressure jet cooling shower the same coolant was used, the lubricity and loosening effects of the liquid remained unchanged. The physical nature of the phenomenon of the increase of the cutters' durability during the pressure jet cooling, directed from the back edge, consists in the increase of heat elimination from the tool. The action of the jet directed from the back edge of the tool helps to destroy the steam jacket which is developed by the heated cutting point in the narrow v-shaped backlash (Fig. 1), and thus improves the conditions of heat elimination.

The analysis of cutter durability during different cutting speeds

(Fig. 5) shows that this durability varies in case of standard top spraying (curve 1) and in case of pressure jet cooling shower (curve 2).

The increase of the cutters' durability ratio when operating with pressure jet cooling vs. the cutters' durability when operating with standard top spraying, during the increase of cutting speed, is evidently connected with the change of the wear-resistance during different speeds of friction for different standard forces.



5. The changes of cutter durability dependent on cutting speed.

The results of the comprehensive analysis of the abrasion of the cutters and of the changes of cutting forces and temperatures during work without cooling (curves 1), with standard top spraying (curves 2) and with pressure jet cooling shower during most favorable parameters (curves 3), are shown in Fig. 6. With the increase of cutting speed in the temperature range of steel blue-brittleness, the cutting forces slightly decrease. A further increase of cutting speed produces a marked rise of the temperatures on the cutting blade and an increase of cutting forces in the range of temperatures of steel aging. This is connected with the increase of work input for plastic deformations of metal and for friction during the increase of cutting speed.

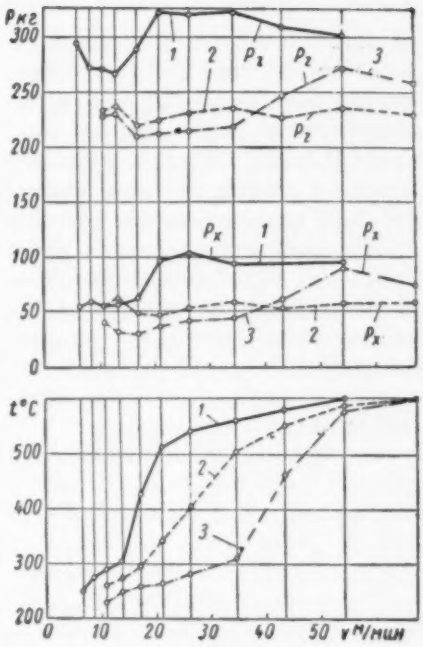
During temperatures higher than 500° the cutting forces start to decrease. During work with standard top spraying the forces also decrease slightly in the range of blue-brittleness temperature and therefore, with the increase of cutting speeds, remain nearly unchanged with a tendency towards a slight increase. This occurs as the result of the intensive elimination of heat from the chips in the zone of their

formation and hence, as the result of nearly identical temperature conditions, in the process of plastic chip deformation.

During work with pressure jet cooling shower directed from the back edge, a slightly more marked decrease of cutting forces may be observed in the temperature range of blue-brittleness, while the temperature of 300° develops during a speed of 105 sfm. instead of 55.7 sfm. with standard top spraying and of 37.2 sfm.—without any coolant. However, further increase of speed brings about a sharp increase of cutting temperature and the curve of cutting forces rises higher than it does during standard top spraying.

Apparently this is connected with the increase of temperature in the zone of chip plastic deformation in the range of steel aging, when during the increased cutting speed the quantity of liberated heat has not enough time to be eliminated from the chips by the coolant acting on the back edge of the tool. This is confirmed also by the heating of the chips, which become of temper color. During cutting speeds higher than 173 sfm. the temperatures for different cooling systems, which are being registered by a natural thermocouple, become nearly identical, although the cutters' durability cooled by a pressure jet shower remains much higher.

The measurements of the back edge temperature by an artificial



6. The changes of forces P_z, P_x and of temperature depending on cutting speed.

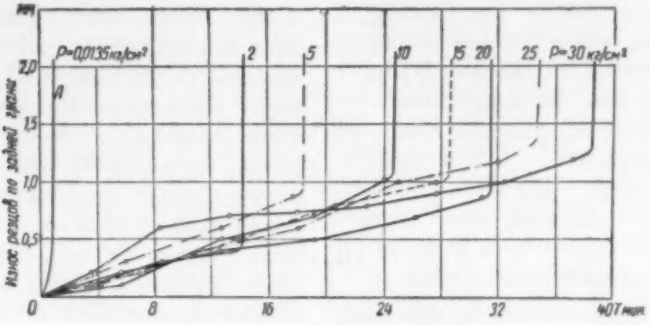
thermocouple show that the use of pressure jet cooling greatly increases the gradient of falling temperatures and therefore decreases the depth of their convection on the surface of the cutting blade edges. This is particularly noticeable on the cutter's back edge which is directly reached by the cooling jet. Here favorable conditions are formed in which the back edge becomes more wear-resistant, and in the process of abrasion a more efficient geometry of the cutting blade is formed, which greatly increases the durability of the cutter.

The observation of the change

of abrasion degrees and characteristics on the front and back edges during the life of the cutter has shown that these degrees and characteristics differ sharply for different cooling methods. During standard top spraying the abrasion of the back edge increases much faster and one of its characteristics is the extreme unevenness of the cutting brim. During the pressure jet cooling shower the abrasion progresses more slowly and the worn-out brim has a smooth line.

The degree of the back edge abrasion dependent on the duration of cutting is demonstrated in Fig. 7; speed is 175 sfm. Curve A has been obtained with top spraying. Here the durability equals 2.3 min. Other abrasion curves are drawn for the pressure jet cooling directed from the back edge; here, the pressure being 29.4 psi, the durability is 14 min. With the increase of pressure the durability increases and at 441 psi reaches 40 min. During high pressure cooling stable increment is observed even at 164 sfm, while during top spraying it is already absent at 131 sfm. Also during pressure jet cooling shower the increment does not jeopardize the surface finish.

The practice of pressure jet cooling in normal working conditions during two years confirmed the laboratory analysis. At the Lickachev Automobile Plant during the processing of a clutch of a gear spindle a ring-shaped steel gash is cut (steel alloy 40XHM) .2955-in. deep and .3782-in. wide with a tolerance of .0078-in. Under the old cooling system (top spraying emulsion) the gash cutters with a steel-tipped blade P9 ground 70-80 machine details. They quickly lost their width and the tolerance of .0078-in. did not hold. Since the introduction of the pressure jet cooling system the cutters grind from 350 to 500 machine details, holding the original tolerance. The smoothness of the surface improved by one degree. The operating con-



7. The abrasion of cutters (back edge).

ditions in both cases were the same: cutting speed — 50 sfm; depth of cut — .3782-in.; and feed — .0075-in. The pressure of 58.8 psi for the coolant shower was received through a pinion pump which formerly had been used on a lathe and worked as a standard top sprayer. For cooling a cutting blade 0.378-in. in length a nozzle with three openings had to be used, each opening .0394-in. in diameter; on the suction pipe a netted filter was placed. The use of pressure jet cooling on other lathes also showed a markedly higher cutter durability.

The vane pumps create an emulsion pressure to 0.5 kg/cm^2. They help in many cases to increase durability from two to three times. The pinion pumps used for top spraying create a pressure to 15 kg/cm^2, depending on their technical conditions. Higher pressures are obtained by rotary pumps and by special pumps for high pressure.

The choice of the nozzle's diameter depends on the volume of dirt particles which remain after the filtration of the liquid. Because it is easier to make a round nozzle, several pressure jets in a row can be used for cooling a long cutting blade, with one nozzle for each 2-3 mm. of cutting blade. During small pressures it is recommended to use nozzles at 1 mm. and wider. This simplifies the apparatus for liquid filtration. During high pressures (to 441 psi) nozzles of .0118 to .0137-in. are chosen. In these cases a thorough filtration of the liquid through a laminated or netted filter is indispensable.

For cutters working from the back support with small nozzle diameters there is no need for special protection from the sprinkling liquid. But the forming chips must not be permitted to come between the jet and the tool even for a moment. This brings about an immediate rise of the temperature on the cutting blade and diminishes the cutter's durability.

For flute cutters, shearing dies, shaper tools and also in cases where removal of the chips is assured, there is no need for a special installation to prevent the jet shower from coming into the chip formation area.

Pressure jet cooling can be combined with standard top spraying.

The high pressure coolant (up to 30 kg/cm^2) in the conveying system also considerably increases the cutters' durability. It can be widely used during the processing of large, highly accurate surfaces of large-scale bulky details (in heavy machine engineering) when the dimensional durability is paramount. High pressure coolant can be used during work on automatic lines, where the sprinkling of the liquid is easily eliminated by a special installation and a good filtration of the liquid and the pressure jet stream can be centralized for a group of lathes. • • •

For speed and accuracy
in drilling deep holes . . .





By **Claude E. Sonday,** Accurate Arms & Machine Company
as told to **Darrell Ward,** Field Editor.

Gun drilling is capable of producing phenomenal results. It is especially phenomenal in both speed and accuracy in deep holes, such as are required in artillery pieces and in aircraft hydraulic gear, where depth of hole is extraordinarily deep, and trueness must be held to even more extraordinary limits.

● The gun drilling process is a frank curiosity to people in the shop who have had no experience with this method of boring a hole. It becomes more than a curiosity when a manufacturer finds it to be the only method for producing holes of certain depths, or for holes of any kind in rare metals.

The basic function of a gun drill is not really drilling at all, but boring.

A gun drill is made with a single straight flute with the cutting edge limited to the forward tip. The edge of the flute is not necessarily sharp nor does it perform any cutting action whatever.

In an ordinary twist drill, there are two sharp edged flutes with a chisel edge web between. This chisel edge does more smashing of the metal than cutting. The edges of the flutes perform a reaming type of action against the inside face of the hole. The combined actions result in a tendency to smear or smash the chips, develop excessive heat, drift off center, and often cut the hole out of round or larger than nominal size if the material is particularly difficult, the hole very deep, or the machine setup is not near perfect and handled by an experienced operator.

A gun drill has no dead center. It cuts more like a milling tool producing clean chips. It cannot run out of alignment once it is started in the hole because it is self-guiding. It produces a hole in one operation that usually requires no further finishing, even for fine micro-inch finishes. And, there never is any problem with heat because its proper operation calls for a continuous high velocity flushing of chips away from the tip of the coolant which usually feeds toward

Cast aluminum helicopter landing gear fork, gun drilled in two axes. The deep hole is $1\frac{5}{8}$-in. (plus-minus .002-in.) by 11-in. deep (plus-minus .010-in.) Cross hole has a 1.475-in. diameter (plus-minus .002-in.) by 4-in. long.

the tip through an internal hole and away from the tip through the flute.

There is an abundance of literature published on gun drilling, but many people have been confused and even have run into serious problems because much of this material is not specific enough in details of shop practice. And, some confusion exists because of the misleading name of the method.

Gun drilling is not really drilling, nor is it limited to guns and similar holes. It is much more than this, and can be profitably applied to any depth hole as shallow as, perhaps, the diameter of the tool or as deep as any material can be formed, many hundreds of times the diameter of the drill.

It is not inconceivable to bore a hole in hard-to-machine material, 30' to 40' long in a matter of minutes if a gun drill could be made that long, a machine could hold the part and drill in accurate alignment with sufficient pressure at high speeds, and the coolant is properly flushed through the drill during the operation.

It would not be necessary to back the drill out to relieve the pressure, cool the drill and part, or remove the chips.

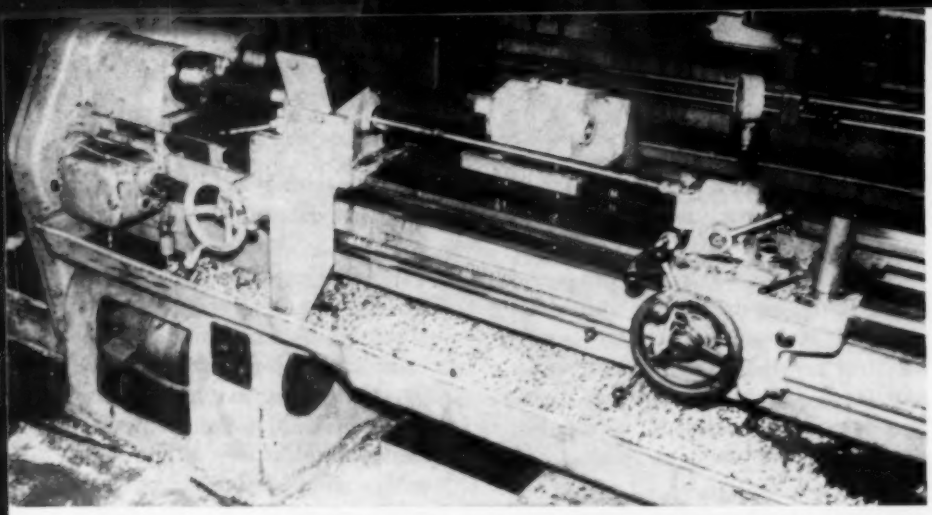
Since the O.D. of the drill performs no cutting, it burnishes its way through the hole and is self-guiding once the hole has been started. It will follow its own path in true alignment once the hole has been bored to a depth of approximately half the diameter or more.

For this reason, the chuck or gun drill fixture must be given special attention to provide absolutely true presentation of the drill bit to the work. Normally, this would mean a tolerance of .0003" or less for concentricity and parallelism, end to end. While there is no deflection of the point as with twist drills, the gun drill will bore true to the direction in which it is started and this very feature prevents any correction whatever, once the work is begun. The original error will multiply by the depth of the hole. A close tolerance pilot hole or bushing of a length at least equal to the drill diameter, makes an ideal drill guide.

When is gun drilling preferred over other forms of drilling or boring?

Gun drilling will prove an advantage when tolerance, finish, depth of hole, and difficult materials present unusual problems.

As an example, ordinary machining of Titanium is considered next to impossible in many shops. It is one of the most difficult materials to drill. Yet, it is one of the easiest to gun drill almost to any desired depth. This would sound fantastic to someone familiar with the typical way that Titanium will seize



Pratt & Whitney 1-B gun drilling machine set-up for a helicopter pitch hub. This is a very critical part with a plus-minus tolerance of .001-in. on the 1¼-in. hole. Drill penetration is 1½-in. per minute; 400 sfpm; 1200 rpm; oil pressure is 350 psi from a 15 hp coolant pump at 20 gpm. The spindle motor, however, is 3 hp.

like a solid weld, once a standard drill has penetrated a depth of one or two diameters.

Titanium tends to smear or rub off on the margin of a cutting tool. It loads up, galls, then binds solid. But, the clean-cutting and flushing of chips at the point of a gun drill eliminates the problem entirely. That is why Titanium actually is one of the easiest metals to gun drill. Aluminum is quite similar.

What materials and what conditions are best for gun drilling?

Gun drilling would be applicable to 90% of the common materials being machined, such as steel, aluminum, brass, and others.

With such metals, it is common to hold concentricity within a tolerance of plus 0.0000″—minus 0.0002″. Finish may develop so fine, and usually does in most applications, that additional grinding or lapping would not be required. Finishes finer than 4- to 6 rms are normal and a range of 15- to 18 rms are common in difficult jobs. Finish tends to be better on hard materials than on soft, although aluminum is an exception.

Gummy materials, such as stainless with its generally poor machinability, must be heat treated before gun drilling. Alloys of this type, when partially hardened, will produce good finishes.

Hardness and brittleness offer advantages found in cast iron or semi-steel which are commonly drilled to produce a finish better than 10 rms. Yet, the exceptional metal, aluminum, often come off the drill with better than 3 rms. The

general run of unhardened steel machine parts may range from 20- to 30 rms.

Steels in the 400 series are very difficult to gun drill in the annealed state. Heat treated, they are feasible, but not if a very fine finish is expected. Therefore, depth of hole and speed of operation would be controlling factors.

Pure copper is not well suited to gun drilling. The drill will tend to pull itself into the work because of the negative rake on the cutting edge. Copper tends to "string" instead of breaking up into uniformly fine chips, necessary to good gun drilling practice.

Aluminum is one of the "nicest" metals. Unlike copper, aluminum chips work-harden as they are cut, and will break up into very uniform particles which are easily flushed away. Copper does work harden to some extent, but does not so fast as aluminum.

When would gun drilling be ruled out?

To arrive at an answer for this question, three basic requirements for gun drilling must be considered:

1. Either the part or the drill must be rotated in perfect alignment. Unlike other common methods of boring and drilling, gun drilling usually is done with a drill fixed and the part rotated.
2. An absolutely constant positive feed must be maintained throughout. This requires considerable expense and care in establishing limitations on the jig, fixture, or machine itself. No hesitation, metal spring, or other irregularities can be permitted. Not every machine nor every set-up is made this positive.
3. A large volume of coolant must be supplied at high velocity. In most machine operations, a copious flow of coolant simply means flooding the cutting tool and part. A copious flow of coolant in gun drilling may mean from 2 to 20 gpm flow rate, with pressures ranging from 200 psi to 1800 psi.
4. If the other requirements are met, gun drilling still would not be applicable if the run is too small. The method is indicated specifically for large run production.

If the job, the machine, and the setup can meet these needs without excessive cost or labor, gun drilling would be profitable for numerous common jobs, even very shallow holes. More and more large manufacturers are adapting it to every day runs on transfer lines and similar operations.

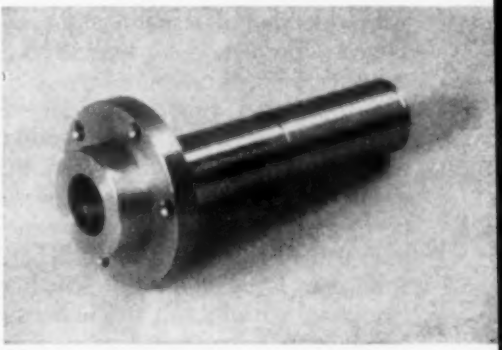
While most people think of gun drilling in connection with deep holes, it is very desirable in the manufacture of many relatively small parts with holes not so deep.

A typical example is found in one part which Accurate Arms contracts for the A. B. Dick Company.

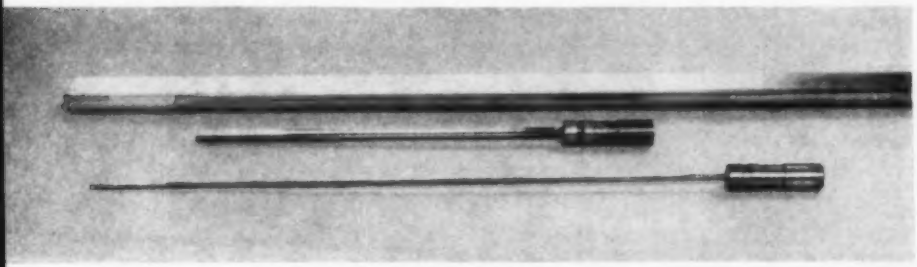
The part is a cam hub for a business machine. It is completely finished except for internal boring at the manufacturer's plant. After it is gun drilled, no further finishing is done. The part goes immediately into assembly.

Total indicator runout when mounted on a shaft must be not more than 0.002". The tolerance for the I.D. of the hole is plus 0.001"-minus 0.0005". The material is a mild carbon steel, heat treated before machining, and Accurate Arms gun drills the part on a production run basis economically. And, although the specification is not required for its application, the finish in this hole is kept well below 15 rms.

To make this part by conventional methods, the first operation would be to drill the hole, ream it, place it on a mandrel, chuck this in a cylindrical grinder, and grind the O.D. to match the hole. But, because of gun drilling as the last operation, the part now can be ground on a centerless with through feed, almost equivalent to dumping parts from a bushel basket into a hopper. This is a dramatic example of both speed and precision



Cam hub for A. B. Dick Co. was gun drilled .627-in. I.D. after all finish machine operation were completed. Total indicator reading was .003-in. at either end of the 4½-in. length. Material is B1113 free machining screw stock.



Three conventional gun drills used in Accurate Arms plant in Schiller Park, Ill. Foreground: .177-in.; middle: .375-in., back: 1.092-in. with replaceable tip.

obtained in routine gun drilling work.

A still more dramatic example of dollar savings is illustrated in an aircraft contract. See illustration on page 112.

The original part manufacturer used aluminum tubing to produce a hydraulic cylinder. Raw material was purchased with a small hole which was bored, reamed, and then honed in order to get a smooth true cylinder.

Sub-contract gun drilling saved all this grief and considerable money for the manufacturer by eliminating all these operations to perform a single operation, boring to finish tolerances in a solid bar. Solid bar is economically feasible compared with tubing, if much material is to be removed as in this case. It often is economical, even with less material removed from tubing, if the cost of subsequent operations can be eliminated.

The hydraulic cylinder was 36" long with a hole 1.545" in diameter. The finish produced by gun drilling solid bar was less than 3 rms.

Original costs for reworking tubing amounted to about $4 to $5 for boring, several dollars for reaming, and approximately $9 for honing. These operations tied up men and machines for something like 3½ hours. The part was gun drilled in a matter of minutes with a net savings in excess of $10.

If gun drilling produces such dramatic results, why wouldn't every large or medium production shop want to make an immediate switch to this technique?

Random Selection of Typical Job Set-ups

Drill Dia. & Type	Spindle Speed RPM	Feed In./min.	Part or Mtl.	Oil Pres.	SFM	Remarks
.625 Carbide	3362	6	B1113	500#	550	Drill life: 5 hr between resharpening. Higher speed & feed possible.
.375 Carbide	6000	7	24ST Alum.	900#	1000	Higher speed & feed not possible with machine.
.437 Carbide	5200	4	Stres-Pruf Steel	800#	600	Chips wouldn't wash out with heavy feed.
.250 HSS tip	1500	.5	Moly bar	500#	100	Drill had to be resharpened after 2-in. of penetration.
1.000 Carbide	2000	2	1020 HRS	400#	500	
.375 Carbide	1500	1	410 SS Centrif. Cast 35 R_c	450#	150	4½ gal. of oil per minute used.

Shops often have been led into attempts at gun drilling when their facilities were inadequate, their materials wrong, the tools not specifically designed for the job, and, perhaps, lack of understanding by the operator.

Factors most often neglected in discussions of gun drilling are of the most importance to the manufacturer and the machine operator who will become involved in the operation. These are functional limitations.

Stainless steel provides an example. This material seems to have a strong affinity for the carbide tip of a gun drill. Hence, proper lubrication is vital. The selection of a proper coolant is a serious problem. For materials such as aluminum, carbon steel, cast iron and a few others, almost any coolant without special additives will work efficiently. But, materials like stainless, which are often referred to as "gummy," require something other than a common oil such as sulfur compounds to make the chips flush away. The problem cannot be solved simply by compounding a coolant which would cover all cases because this would be far too expensive for the materials not requiring its special features. That would be a costly answer. Therefore, special attention should be given to the coolant and its application to the job on hand.

The major qualities of a good coolant, listed in order of importance, are: viscosity, high lubricity, and sulfur content.

A very low viscosity oil (thin) must be used for easy flow of the coolant under operating conditions. The fluid hole through a gun drill is relatively small compared with its O.D. Also, there are kinetic losses in the piping of the hydraulic system, so by the time the oil reaches the tip of the drill, it arrives with far less pressure and velocity than most people would suspect. That is one of the first problems that must be overcome. In practice, the viscosity of an oil coolant for gun drilling ranges from 60 to 100 ssu.

Lubricity is next in importance. Chips must flush away readily and the O.D. of the drill must "float" inside the hole.

Additives are considered of least importance in gun drilling. A small amount of sulfur may be desirable in some cases to prevent "welding" or galling. The sulfur content, however, in most instances need not exceed 1½%. A straight mineral base oil, as it comes from the refinery, usually contains enough sulfur for most purposes. Other additives have been found unnecessary in shop practice.

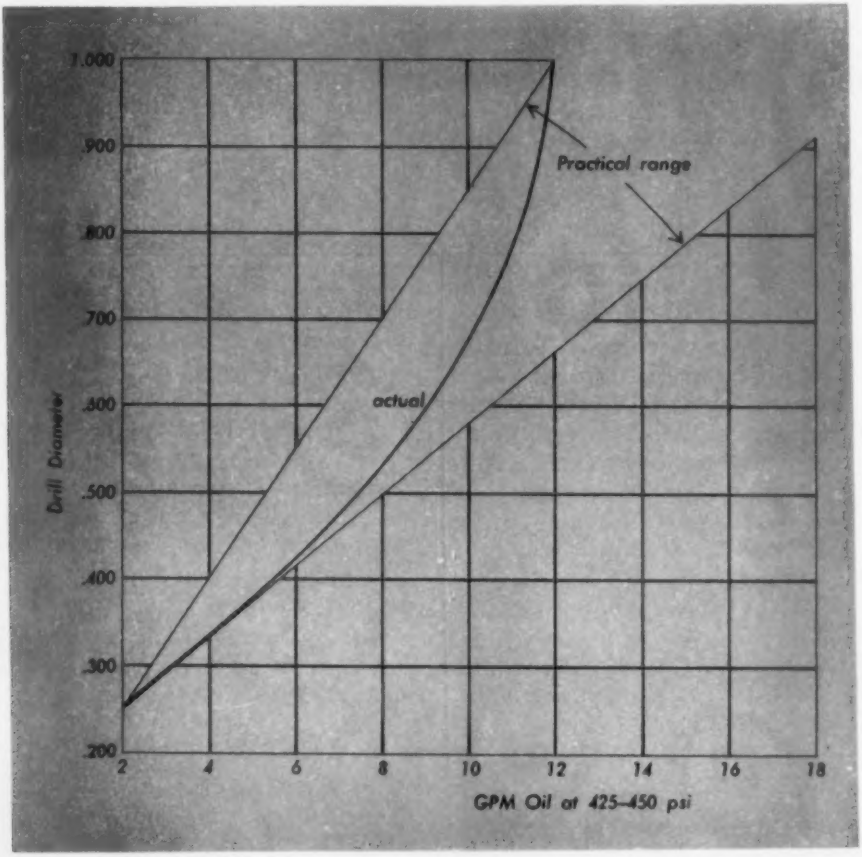
Why would lubricity and the functions of additives rate second and third in importance to viscosity?

Because the flushing of chips away from the drill tip is a most important function. The volume of oil passing through the work, and

the velocity at which it flows are of primary concern in every job. Pressures and rate of flow will vary with different jobs, depending on the material which may be hard or soft, brittle or gummy. Coolant pressure is not vital in itself except for the fact that without pressure, high velocity cannot be developed at the cutting point. High velocity is what helps to break and flush the chips.

A typical set of operating conditions for a ½" drill would be coolant pressures ranging from between 400- to 700 psi with a flow rate of 4- to 6 gpm.

For this set of figures, equipment requirements would be rather unusual compared with other

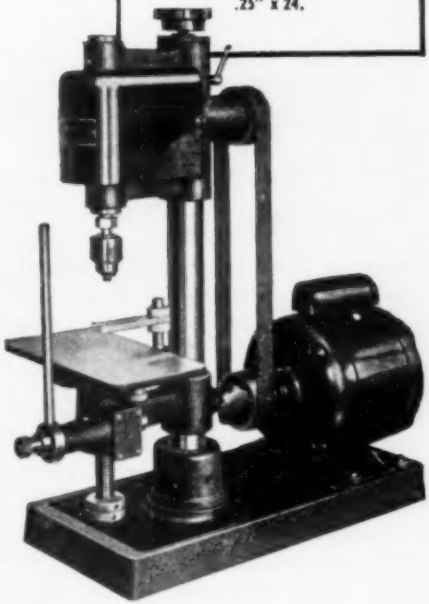


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TAPPING MACHINE

and makes routine of such problem work as the tapping of precision holes in thin metal sheets or in brittle plastics. Even improves performance in the tapping of blind holes!



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kinds of operations. No less than 5 hp drive would be required for the coolant, and as much as 7½ hp may be necessary. The exact figures can be computed from hydraulic tables and curves, or practical operating conditions can be approximated by a good man in the shop when he observes the operation in progress.

For the practical man in the shop, curve data for gun drilling may appear unnecessarily involved in theory. For the experienced operator, there is a rule-of-thumb which almost can overlook the specific and scientific measurements of flow rate, fluid pressure, kinetic energy and such factors. A good operator on the gun drill can reach his hand into the coolant discharge chamber and feel the coolant and chips flowing out from the work. If things are right, the coolant will flow in a very forceful and continuous stream. There will be no intermittent changes in pressure obviously caused by blocking. The chips will impinge against the operator's hand sharply, but not quite enough to sting. The ability to make this observation intelligently comes only with the skill of experience.

Where such experience is lacking, people have run into trouble even though they had enough general data on gun drilling. An example happened recently in a production shop being set-up the first time for that operation. The problem of set-up was well understood and the equipment was installed perfectly. Yet, failure resulted.

The reason for failure in this case was an attempt to use a gear pump for the coolant. Under normal conditions, the pump would have been capable of supplying an adequate amount of coolant. And, the pump was driven by a motor large enough to meet the power requirements. The problem occurred because the thin oil merely slipped through the gears when a pressure of 300- to 400 psi was developed. Sufficient oil for the cuting point of the drill and for properly flushing chips never did pass through the hydraulic system.

Coolant velocity is important. With inadequate pressure and volume of flow at the drill tip, chips would accumulate in the flute. Then, as pressure built up, the block would open and the chips would flush momentarily. This intermittent flow of coolant back at the discharge chamber was a direct clue to the problem, but only after experienced observation called attention to this detail.

It was not known at this shop that high pressure of coolant at the drill tip is only incidental to the basic need for velocity to break and flush the chips.

A pressure gauge installed in the

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this

DIE-PART PORTELVATOR®

(OR AN ENGINEERED VARIANT)

will speed your work
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Top plate raises and lowers for fitting operations and rotates 360° to give easy access to die.



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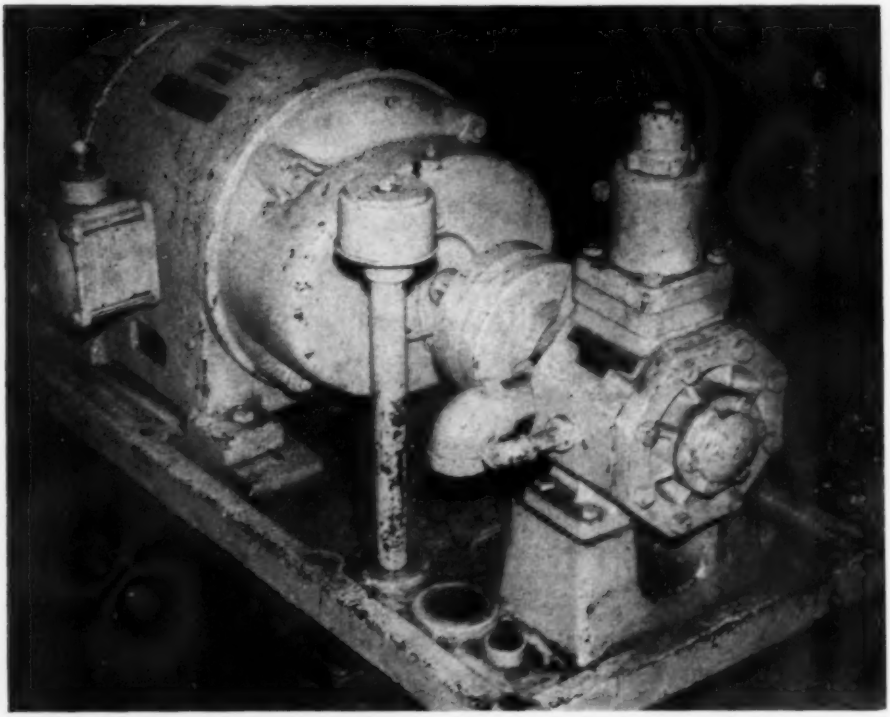
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hydraulic system as close as possible to the drill is desirable to indicate when the proper pressure range is attained. But, this will not always pinpoint problems which can be spotted immediately by the experienced operator. Kinetic losses in the lines or drill, itself, may prevent proper flow at required velocity back through the drill flute.

• • •

Mr. Sonday continues his discussion of gun drilling in the November issue. This installment will include pertinent data on feeds and speeds for various materials, why speeds required limit the size of the drill, producing gun drills to order, why gun drilling is ideal for the rare metals and how standard machines can be converted to gun drilling.



This Racine variable delivery constant pressure coolant pump is typical of the recommended size for 1-in. to 3-in. gun drills. This 25 hp unit maintains pressure without by-passing oil. Capacity is 30 gpm, 750 to 1000 psi.

Acme-Fette rolls threads to tight "specs"



...WITHOUT MAJOR INVESTMENT

The tool engineers of Air-Hydraulic, Inc. were faced with rigid specifications and the necessity of an extremely fine fit and finish for this high temperature hydraulic actuator for aircraft use. Conventional thread cutting methods would have been costly.

After careful study they found that Acme-Fette thread rolling heads would meet all requirements when applied to their *existing turning equipment*. Major machine investment was eliminated and a low rejection rate meant additional economies because threading was the last of a number of costly operations.

The Results

- 1"-20, ¾"-16, and ⅝"-24 threads were rolled 5 times faster than possible with conventional thread cutting dies —thread rolling speeds are equal to turning speeds with high speed tool steels.
- Cold-forming action of the Acme-Fette produced a tougher thread and one 60% smoother than grinding or chasing (a 5 micro-inch finish).
- Rejection rate: less than ½ of 1%.

The Material

- Steel: 4340—upset forging
- Tensile strength: over 160,000 p.s.i.
- Hardness: 36-40 on Rockwell C scale

For cost-reducing ideas showing how you can put Acme-Fette self-opening thread rolling heads to work on your present equipment, send for Bulletin NAF-57A.

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Molding Electric Plugs

• The job of molding electrical plugs and connectors was proving to be a very troublesome one for Beckley Electric Company of Brooklyn, N.Y. With installation of a versatile press, the process became simplified and efficient.

To perform the job with uniformity, an 8-ton Denison hydraulic Multipress was installed (Fig. 1). This press was specified for this molding operation so that the pressure would be adequate, and at the same time gentle enough not to tear the rubber pellets.

At the outset of the run, the operator places a box of square uncured rubber pellets at the left side of his press on a work table. The molding die is then prewarmed at approximately 350 degrees for six minutes.

Next, two cardboard drums on wheels are brought to the working area. These drums are filled with electric cords which have two brass terminals attached to the end of the cord which is to be molded with the female plug. (Fig. 2) Both the drums have metal holding arms attached to the sides of the drums on which the loading bar of the molding die rests for loading purposes.

The operator loads 12 cords manually on the loading bar, as a 12 cavity molding die is being used. He then wheels one drum in front of the press and proceeds to load the cords already mounted on the loading bar into the molding die (Fig. 3).

The rubber uncured pellets are placed on the die with the operator's left hand. Next in sequence is the actual molding process. After the cord and pellet are properly located on the molding die, the operator presses the dual controls, in front of the press. He must place both hands on the control levers, one with each hand, as both levers must be depressed at the same time (Fig. 4); thus, this safety device insures keeping both hands in a safe position away from the die when the ram comes down.

The ram of the press descends and when at full descent, the operator locks the control levers by means of two metal lock bars. This is done to allow for mold time.

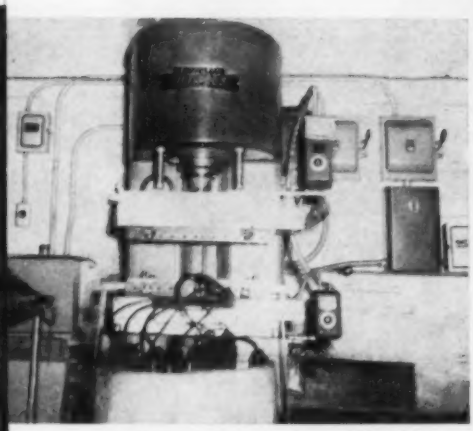
The flow of the material is accomplished by the mixture of the material, heat and pressure. The molded parts are then cured for 10 minutes. During the curing time, the other loading bar on the second drum is loaded by the operator. This is done in sequence during molding process time. It is important not to cut short curing time, because proper time leads to improved production with a greater return on tool, equipment, and product investment, that benefit is obvious.

After the cycle has been completed, the control levers are unlocked and the ram begins its upward stroke. The press operator has only to remove the molded parts to the tote box at the right side of the press, reload the cavities with the rubber pellets and the loading bar with the 12 cords and operate the press levers.

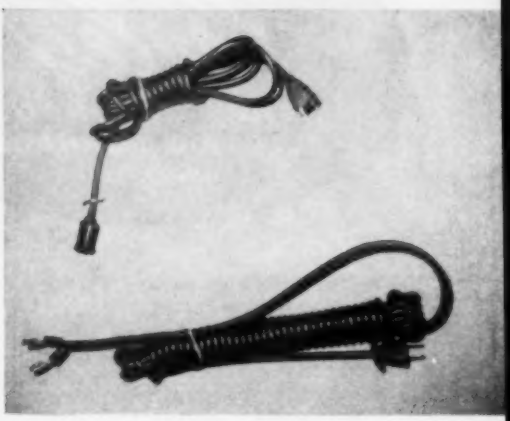
Standardization of frame and press platens reduce the average setup time.

• • •

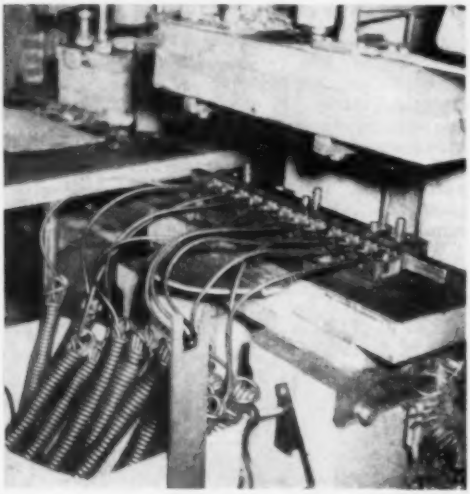
and Connectors



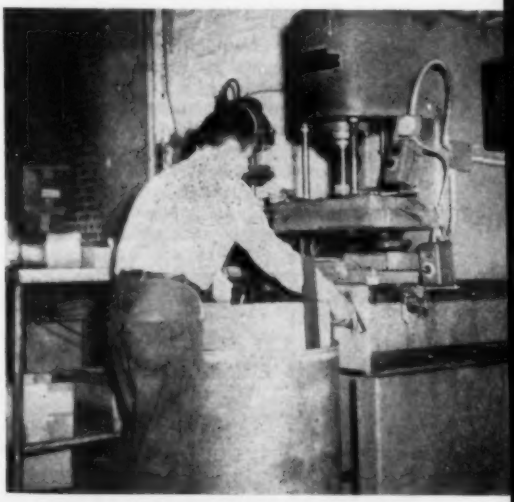
1. An 8-ton Multipress was specified to perform this job of molding which must have adequate pressure, yet be gentle enough not to damage the rubber pellets.



2. Before and after: Cord on the bottom shows the uncomplete head with its two brass terminals; cord (top) displays a completed molded connector.



3. Twelve cords are placed on loading bar into the press at one time. It takes ten minutes to complete molding operation.

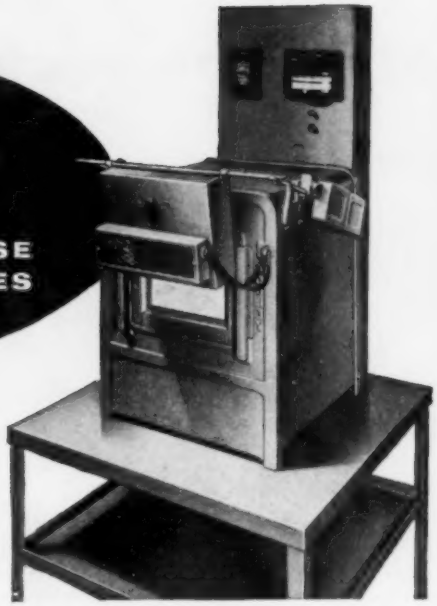


4. Safety device: Placing his hands on the safety control levers, the operator lowers and locks the press to begin the molding

Cooley

GENERAL PURPOSE ELECTRIC FURNACES

(bench type)



- Easily installed anywhere with simple wire connections.
- Embedded type elements for maximum efficiency and ready replacement.
- Easily operated with automatic temperature control.
- Two types—to operate at 1850° F and 2,000° F.

HEAT TREAT SMALL PARTS, TOOLS, DIES, ETC. . . . IN YOUR OWN PLANT

These small electric furnaces are designed for general heat treating, hardening and tempering of small parts. Their uses include heat treatment of aluminum, copper and beryllium. Cooley embedded elements have been employed in high temperature furnaces for over twenty years with outstanding success. Cooley furnaces are easy to operate—at high or low temperatures—without experienced heat treaters. (There are no fumes or odors—no ventilating necessary.)

Quick, correct and easy installation is provided by the Cooley Control Panel (optional equipment) which makes the complete assembly a package unit. A proportioning type of control pyrometer is recommended for maximum accuracy and to accomplish low temperature tempering and uniformly controlled temperatures. All units are completely assembled and tested at factory.

Write for new catalog of electric furnaces and ovens.

MODEL	SIZE—INSIDE W	H	L	SIZE—OVERALL W	H	L	WATTS @ 230V—1Φ	MAX. TEMP. °F
MH-3	8	6	14	21	25	25	3400	1850
MH-4	10	6	18	23	25	29	4500	1850
VH-3	8	6	14	21	25	25	3400	1850
VH-4	10	6	18	23	25	29	4500	1850
VH-48	10	8	18	23	27	29	4800	1850
VK-6	8	6	14	25	26	25	4650	2000
VK-7	10	6	18	27	34	36	6500	2000

"M" Models—Hinged Door. "V" Models—Vertically Sliding Door.

Proportioning Pyrometers (Brown Pulse Pyrovane and Wheelco Model 293) and Non-Proportioning Pyrometers (Brown Pyrovane and Wheelco Model 292) carried in stock. Any standard make or type available.

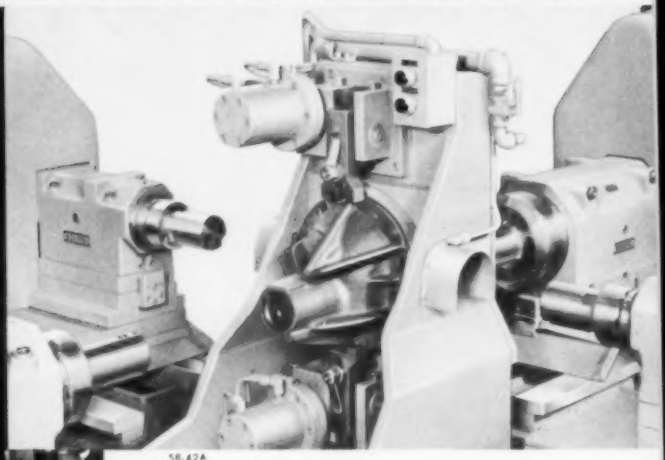
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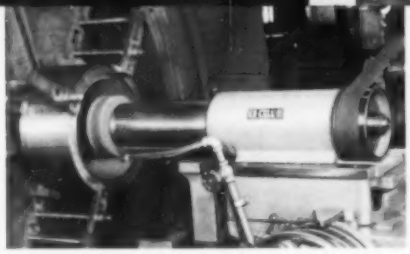
EX-CELL-O Precision Production News

COST-CUTTING IDEAS FROM EX-CELL-O CORPORATION — DEVOTED TO MINIMIZING COST OF PRODUCTION

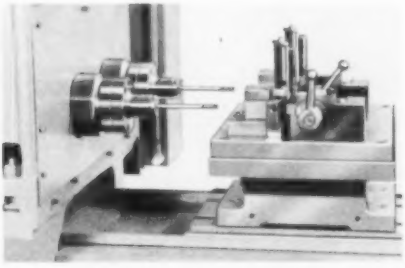


58-42A

Exacting limits are held by Ex-Cell-O Precision Spindles boring pinion bearings and cross hole in this automotive differential carrier. Pre-loaded ball bearing construction of Ex-Cell-O Spindles plus sealed lubrication insure long life and low maintenance.



Internal grinder uses belt-driven spindle to grind 10" I.D. to closest tolerances. Belt-driven Ex-Cell-O Precision Spindles are available in a full range of speeds up to 25,000 rpm.



Two Ex-Cell-O Precision Spindles are used in this Bor-Drilling setup to drill jet engine blades with extreme accuracy. Ex-Cell-O Spindles hold critical limits in either ferrous or non-ferrous metals.

Do More Jobs— More Accurately

Standard Ex-Cell-O Precision Boring and Grinding Spindles cut costs in precision production

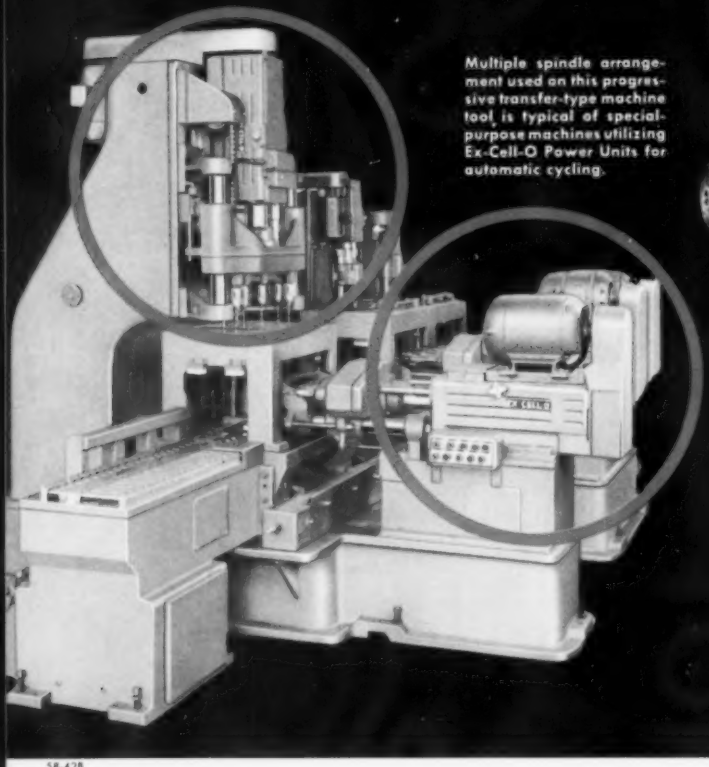
Installed as original equipment or as replacement components, standard Ex-Cell-O Precision Spindles put job-engineered efficiency into every job—surface grinding, I.D. grinding, precision boring and other applications.

Whatever the type—belt driven, air driven or motorized, designed for standard current or high frequency applications—Ex-Cell-O Spindles have earned an enviable reputation throughout the world for precision and versatility, for long-lasting operation, and for production savings.

Pre-loaded ball bearing construction, absence of vibration and chatter and low maintenance make Ex-Cell-O Spindles first choice for close-tolerance, fine-finish work. Spindles also are available with heavy duty bearings for roughing and semifinishing operations.

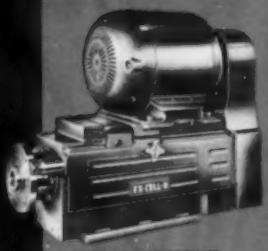
Your local Ex-Cell-O Representative can give you all the details, or write direct.

3 MORE COST-CUTTING IDEAS



Multiple spindle arrangement used on this progressive transfer-type machine tool is typical of special-purpose machines utilizing Ex-Cell-O Power Units for automatic cycling.

58-428



STYLE 28-A HYDRAULIC POWER UNIT



STYLE 22 QUILL-TYPE HYDRAULIC POWER UNIT



STYLE 20 HYDRAULIC POWER UNIT

POWER

for Changing Production Needs

EX-CELL-O QUILL-TYPE HYDRAULIC POWER UNITS CAN BE USED OVER AND OVER AGAIN, PUTTING POWER WHERE YOU NEED IT, WHEN YOU NEED IT

Ex-Cell-O Hydraulic Power Units lower manufacturing costs even on short and medium runs by performing a variety of jobs—adapting quickly to your changing production requirements.

Used to actuate single tools or multiple spindle heads for drilling, counterboring, facing, reaming and other operations, they are designed as a compact "power package" to permit close center distances when used in-line or when rearranged and positioned radially around a fixture.

Suited to many applications, including special machines with automatic cycling, Ex-Cell-O Power Units are self-lubricated, easily installed, and they're built with famous Ex-Cell-O precision for trouble-free, long-lasting service.

Call your local Ex-Cell-O Representative or write Ex-Cell-O, Detroit, for details on the full line of Hydraulic Power Units.

This is cost-cutting— with CTW Carbide Broaches

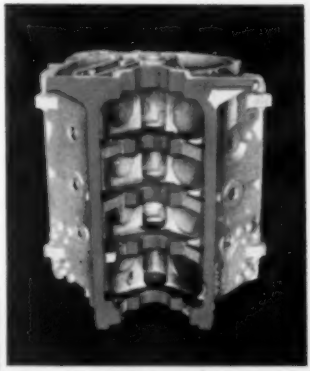
Continental Broaches increase output and reduce downtime in automobile engine block production

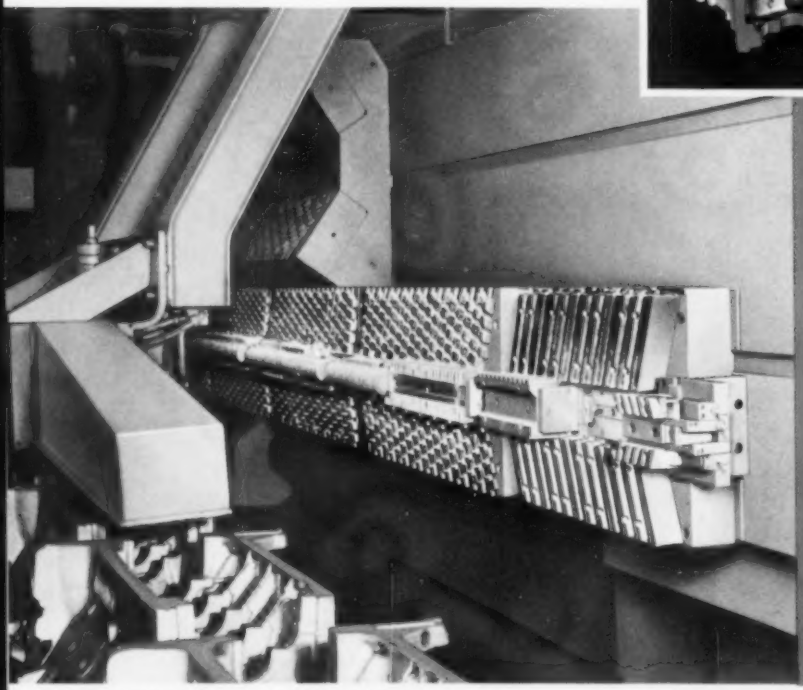
Greater production with less downtime are just two of the important reasons why a large automobile manufacturer uses Continental tooling for broaching of pan rail, half bores, bearing locks and parting faces of V-8 engine blocks.

Removing a maximum 3/16" stock in a single pass, this five-section, combination half-round and face broach uses carbide-tipped tool bits and broach inserts to semifinish and finish 20,000 to 22,000 cast-iron blocks between tool resharpening.

This automotive operation proves again why the production savings made possible by Continental tooling makes the "best cost less" than ordinary broaches.

58-42C





Above: In a single pass, multiple surfaces of this cast-iron engine block are semifinished and finished. Maximum stock removal is 3/16".

Left: Continental Broaches used in this horizontal surface broach machine are made up of five sections combining half-round and facing broaches. Tool bits and broach inserts are 100% carbide-tipped.

CONTINENTAL TOOL WORKS division of EX-CELL-O CORPORATION

EX-CELL-O PRECISION PRODUCTION NEWS



SB-42D

Make the scrap-pile test!

Start using Ex-Cell-O Drill Jig Bushings today—then watch how worn-out bushings disappear from your scrap-pile!

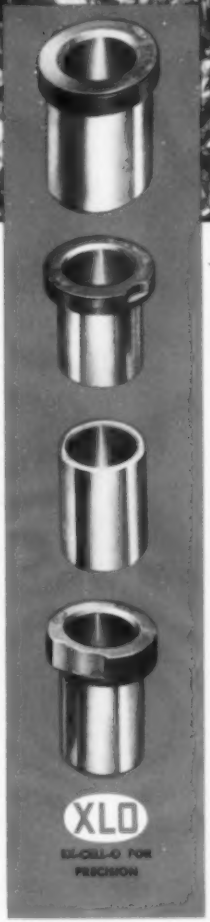
The reason is simple: Ex-Cell-O Drill Jig Bushings last longer because they're made better!

The answer lies in the chrome-alloy bearing steel used in Ex-Cell-O Bushings; in up-to-date automatic heat treating methods; in hole hardness quality-controlled to uniform 62-64 Rockwell "C"; and in Ex-Cell-O's own high standards for precision-ground finish inside, outside and under the head for perfect seating.

All this—plus immediate delivery to your plant from the large Drill Jig Bushing inventories Ex-Cell-O maintains at key points throughout the country.

You get fast service on special sizes, too, because Ex-Cell-O stocks many semifinished bushings in addition to the more than 10,000 standard sizes always on hand.

For "same-day" shipment, order from Ex-Cell-O Corporation at Detroit, New York, Cincinnati, Downey, Calif., or London, Canada. Call your local Ex-Cell-O Representative or write direct for an Ex-Cell-O Drill Jig Bushing catalog today.



EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

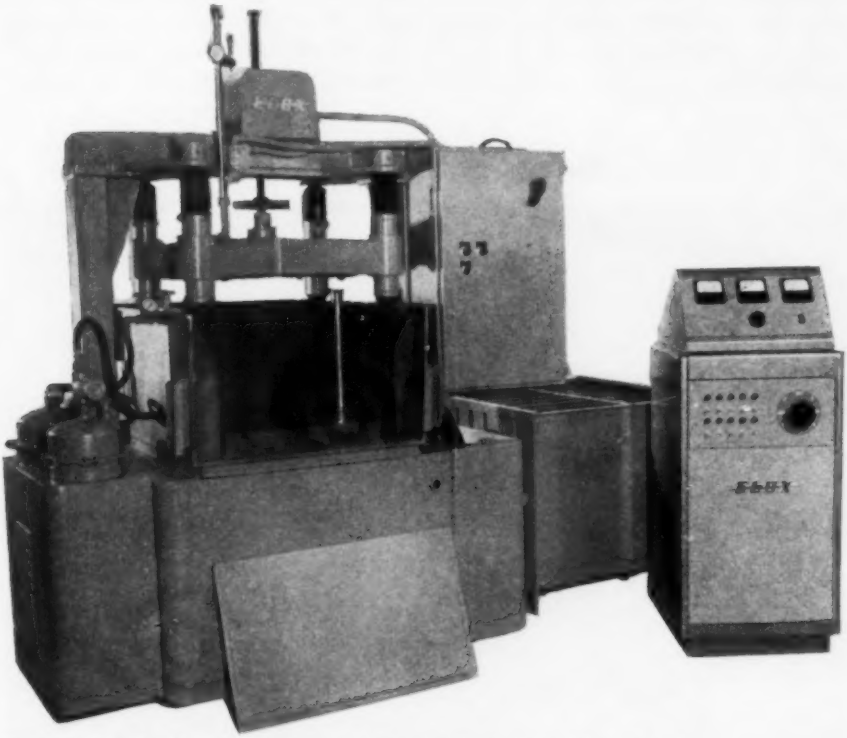
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES CUTTING TOOLS • TORQUE ACTUATORS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

NOW–

Electro - Chemical Machining

● A significant advancement in the art of electrical machining, Electro-Chemical Machining, has been announced by the Elox Corporation of Michigan as a companion to their present Electrical Discharge Machining Process.

The heart of the new electro-chemical machining method of metal removal relies on an electro-



Elox electro-chemical machines are being built for industry with ratings from 500 to 50,000 amps; electrode area from 3- to 1000 sq. in.

While the maximum current practical from electric discharge

chemical or electrolytic action on the work block (part being machined) rather than a series of electrical discharges between electrode and workpiece.

Any metal may be deposited on or plated to a surface. Not quite so well known is the art of electro-polishing or chemical milling in which the reverse of this action removes or deplates metal uniformly over the entire surface of a metal workpiece.

This new Elox machining process uses a basic electro-chemical action, coupled with an electrode (very similar to that used in Electrical Discharge Machining) *to accurately machine a hole or cavity into a work block.* A very sensitive servo-feed system is used to advance the electrode into the work block as machining progresses, exactly as in "EDM." Since substantially all of the electro-chemical machining takes place at the area in

Die Partially sunk . . .



Partially sunk die has electrode retracted for photo purposes.

equipment is about 200 amp., ECM currents are unlimited

closest proximity between electrode and work, on accurate reproduction of the electrode shape occurs in the work block.

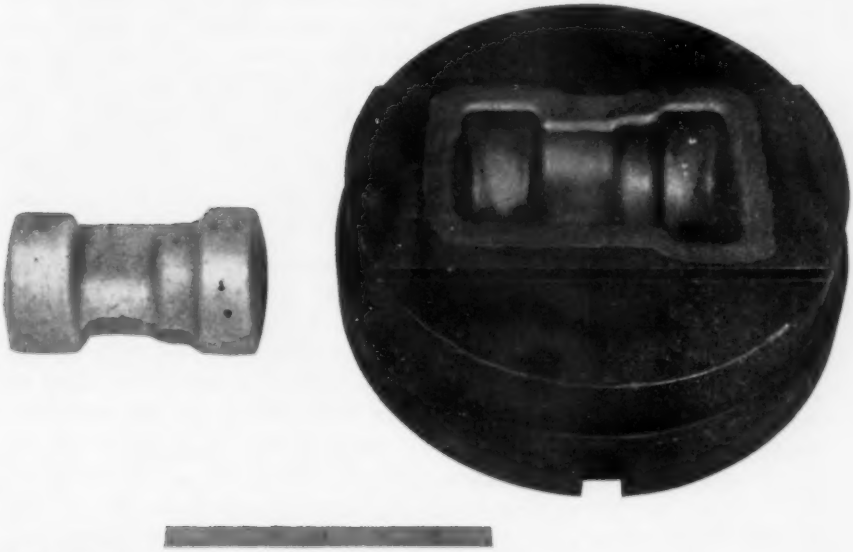
The electro-chemical machining process was developed primarily because Elox's Research Department found that the maximum current practical from "EDM" equipment was in the order of 200 amperes. Electro-Chemical Machining currents are unlimited.

Elox Electro-Chemical Machines will be built for industry in the following sizes, giving the indicated metal removal rates:

Rating	Metal Removal Rates	Minimum Electrode Area
500 amps	3 cu. inches/hour	3 inch sq.
1,000 amps	6 cu. inches/hour	6 inch sq.
5,000 amps	30 cu. inches/hour	100 inch sq.
10,000 amps	60 cu. inches/hour	200 inch sq.
50,000 amps	300 cu. inches/hour	1000 inch sq.

The Elox Corporation points out

Finished Die and Electrode



Die block was roughed with ECM and finished with EDM.

With ECM, the electrode cost is comparatively low

the following advantages for Electro-Chemical Machining:

1. Extremely high metal removal rates.
2. Reasonable accuracy of contour at these high metal removal rates.
3. Low cost per cubic inch of metal removed.
4. Inexpensive electrode preparation and minimum electrode use.
5. Safe operation.
6. A simplified device requiring minimum training for operation.
7. A device requiring low capital investment compared to conventional methods.

This new process has the following salient features:

1. Electrode wear is virtually nonexistent. One electrode will make many parts without appreciable wear.
2. Any conductive material such as lead, tin, solder, etc., can be used as an electrode material. Even sprayed or plated electrodes will be satisfactory in many applications. The surface finish at the higher amperages will be less than 50 micro-inches and the lower amperages will be less than 25 micro-inches.
3. On cavities with gentle contours, tolerances of plus or minus .003 will be possible.

The 500, 1,000 and 5,000 ampere power supplies are now currently available commercially.

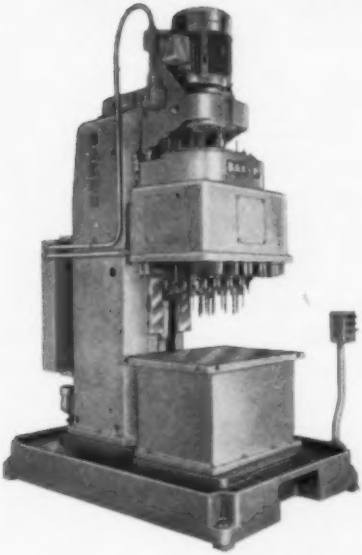
When do you use ECM as a method of metal removal? The answer, of course, is that it is either more or less practical to machine by ECM than EDM or the conventional methods. There is not just one factor involved, but a combination of several factors: amount of metal to remove shape of workpiece, hardness of material, tolerance requirements. In many production applications the need for burrless drilling is becoming more and more important. When drilling inside an engine, for example, there's no way to get the burr off. With ECM, of course, there would be no burrs, no uneven edges.

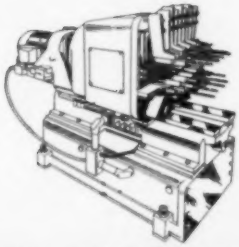
Theoretically, there is no limit on depth of cavity or size of diameter in ECM. There is a limit on the small side, but no limit on the large side. You can go as deep as you want, and as big as you want.

With a 50,000 ampere power supply 300 cubic inches of metal can be removed. Obviously you are not going to do that unless you have a large workpiece, because a

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During this process the machine hours are "unattended"

minimum electrode area for this removal rate is a thousand square inches.

When the material to be machined falls outside the category of ordinary steel, the coolant composition must be changed to provide the proper electro-chemical action. There are two basic chemical solutions that will be used, one for carbide, the other for the steels.

On some applications, there are unusual configurations of the workpiece to contend with. Turbine rotors made of high tensile materials cannot be machined by mechanical methods. The ECM process could be used directly, and possibly exclusively, to machine such a part. If extreme accuracy is required, EDM would be used to rough out the material and EDM to finish.

A number of high temperature, very hard steels and exotic alloys are used in the aircraft industry. There is virtually no other way of machining these alloys other than by electrical means, either ECM or EDM. The limiting factor in the past has been that the metal removal rate of EDM is too low for production volume.

At no time does the electrode in either ECM or EDM process physically contact the workpiece. There is a gap between the electrode and the work block. Machining a one-inch diameter round hole calls for an electrode somewhat smaller than that, depending on the machining rate and the gap setting between electrode and work block.

For the one-inch diameter hole, if the working gap was exactly .015-in., the electrode would be exactly .015-in. undersize on each side. With EDM, however, the working gap would be much less; it would be held to .0005-in. per side on a finished cut.

Elox expects ECM to be used as a tool in production to a much greater degree than EDM. EDM has been used essentially, in the toolroom. The biggest barrier to the use of EDM extensively in production jobs has been the cost of electrodes. With ECM, the electrode cost is comparatively low.

Elox believes that in the forging field, the cavities will be roughed out with ECM and finished with EDM. The combination of savings over conventional machining methods will be substantial, Elox points out, because during the ECM process the machine hours are *unattended*. It is a case of so many unattended machine hours versus very expensive man and machine hours. • • •



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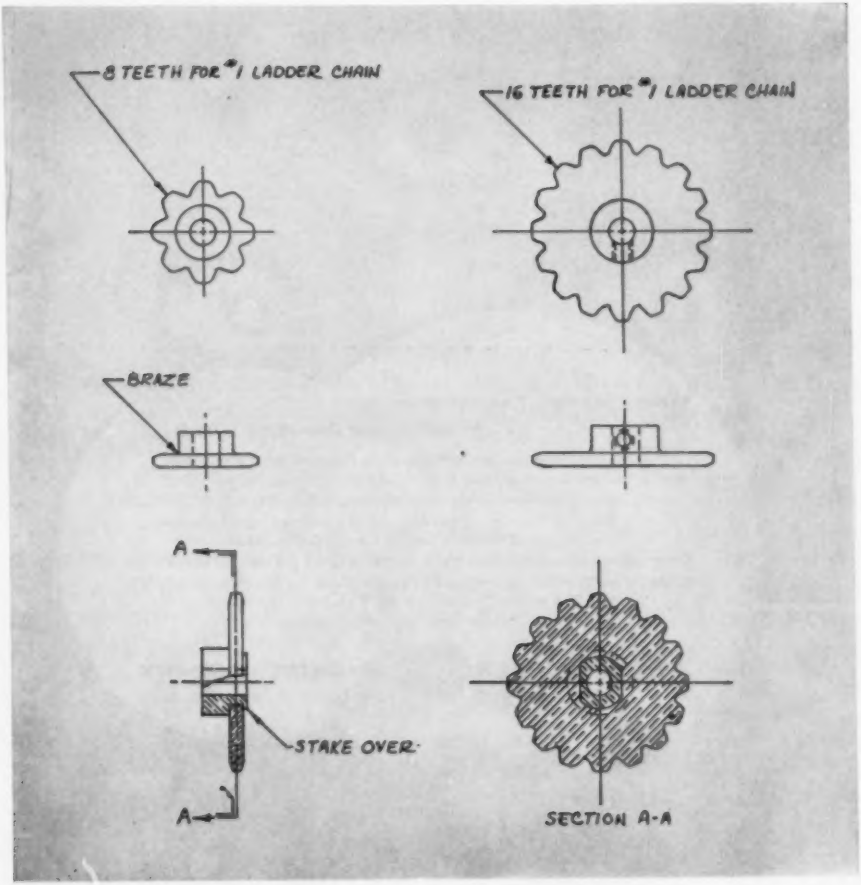
Your Blanchard Surface Grinder is designed to give you peak production and economy on hundreds of different grinding jobs. But, for every job you run, *there's one particular wheel that does it best!* That's why Blanchard manufactures and stocks a wide variety of silicate, resinoid and vitrified bonded wheels and segments.

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Machined Sprockets to Stamped Sprockets

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had enough pullover or chamfer to make a very desirable working part.

In the first case, the sprocket blanks were silver soldered or brazed to the shouldered, drilled and tapped sprocket bushing, see Figure 1.

A later design was introduced with the shouldered bushing being straddle milled with two flaps, such as Figure 2. The pierced hole in the two sprocket blanks was of a size and shape to receive the shouldered and milled bushing, and then the shouldered bushing was staked in the required blanked and chamfered sprocket. This latter gave a more desirable job in event that either one of the completed sprocket assemblies had to be a driver.

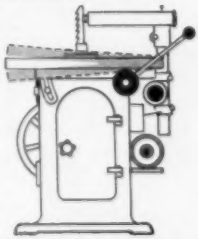
By the introduction of this design, a tremendous saving was experienced.

• • •



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BOOK REVIEWS

MECHANICAL ENGINEERING LABORATORY, Instrumentation and its Application, by Jesse Seymour Doolittle, Professor of Mechanical Engineering, North Carolina State College, published by McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. $6.50

This is the first book of its kind to separate laboratory work on instrumentation and laboratory work for engineering tests. It is also the first to stress the necessity for different types of reports on these two different types of work.

In general, the purpose of this text for the first course in mechanical engineering laboratory is to acquaint the student with the various types of instruments available for making measurements of those quantities which are so frequently encountered in the mechanical engineering field.

MOTION AND TIME STUDY, *4th Ed., by Ralph M. Barnes, published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y.* $9.25

In his new, revised edition, Dr. Barnes adheres to his original purpose of presenting the basic principles that underlie the successful application of motion and time study, supplementing each with illustrations and practical examples.

Five new chapters deal with: motion study, mechanization, and automation; mechanized time study and electronic data processing; systems of motion-time data; work sampling evaluating and controlling factors other than labor, and multi-factor wage incentive plans.

MECHANICAL VIBRATIONS *by A. H. Church, published by John Wiley & Sons., Inc., 440 Fourth Avenue, New York 16, N.Y.* $6.75

In all branches of engineering, many of the vibration problems that arise can be dealt with by a rational application of the basic principles of vibration analysis. This book offers a rigorous, well organized treatment of these principles and, at the same time, lays the foundation for advanced work in this area.

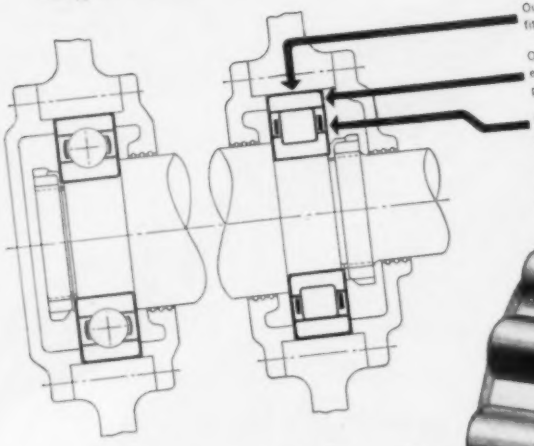
Using a mathematical and physical approach, the author stresses vector methods, the use of complex numbers, Fourier Series, etc. Specific topics covered include: forced vibrations of multimass systems; harmonic analysis; torsional critical speeds; electrical analogies; coupling action; balancing of angle or vee engines.

TURNING: Tools-Methods-Costs by Walter G. Holmes, BSME, B.Sc. Reed Technical Service, 10054 Holmur, Detroit 4, Mich. $7.50.

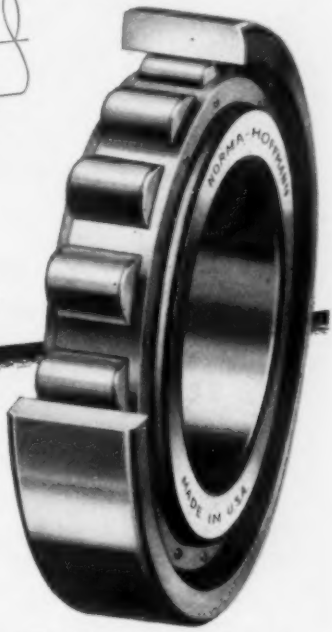
This book presents data on machinability, tool types, tool angles, tool elements, tool materials, tool life, types of turning, tool on the centerline, chipbreakers, speed and feed for all types of screw machine tools, speed and feed for turning and boring, number of cuts, part finish, speed and feed for the different cutting tool materials, tool design for a particular cutting service, analysis of the time per piece, methods of estimating, machine replacement, cost analysis, the cost to manufacture the part, the calculations of automation, feed-back and the methods of tool and machine control.

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This automatic transfer-type crankshaft pin grinding machine is capable of machining 40 automobile crankshafts an hour. A crankshaft enters the first machine and automatically is cycled through the three succeeding operations where the four crankshaft pin journals are ground.

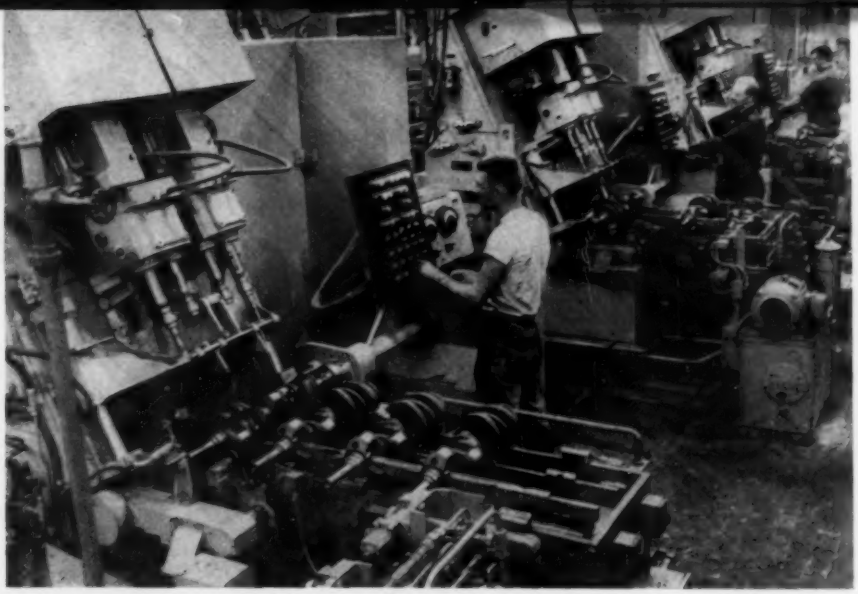
Ford Engine Plant Features Quality Control

LIMA, OHIO—The most completely automatic crankshaft machining lines in the automotive industry and the extensive use of in-process quality control gages, inline machines and gun-drilling operations feature the advance of automation in the new Ford engine plant.

Most outstanding development in the plant is the automated crankshaft area where 80-pound automobile crankshafts are handled with ease as they automatically move through a series of machine tools which make up a 588-foot long machining line. The new plant features three identical crankshaft lines.

The crankshafts are automatically loaded and unloaded at the various stations and are lifted, revolved and positioned with pinpoint precision.

Multiple station quality control gages are built into many of the machines and the part is thoroughly inspected



Crankshafts are automatically balanced on these electronic balancing devices. The machine, which is automatically loaded, determines how much the crankshaft is out-of-balance and where the unbalance is located and then drills counter weights to give perfect balance. When perfect balance has been obtained crankshaft is ejected from machine and routed to subsequent operations.

News of Automation

continued

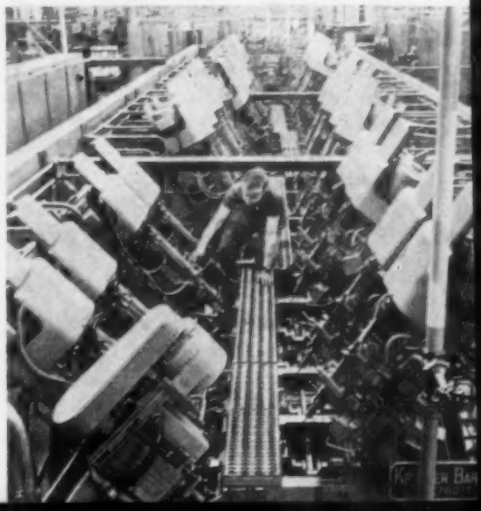
before it passes to the following operation. If the crankshaft does not meet specifications, the gage automatically rejects it and production halts. The trouble area is indicated on the control console and tooling corrections must be made before machining operations can be resumed.

The crankshafts also are electronically balanced by machines which test their own work and, if not satisfactory, automatically repeat the operation. An out-of-balance crankshaft cannot escape from the electronic unit.

Inline machining operations along the cylinder block line feature simplicity and compactness of equipment.

Machining along the cylinder head line is featured by gun drilling and

Special purpose machine tools, such as this 52-ft. long transfer type machine, automatically drill the entire oil system in crankshaft in one continuous operation.



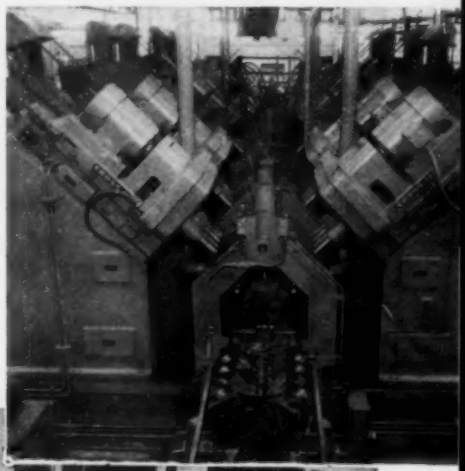
gun boring operations which have been adapted from principles used in drilling gun barrels.

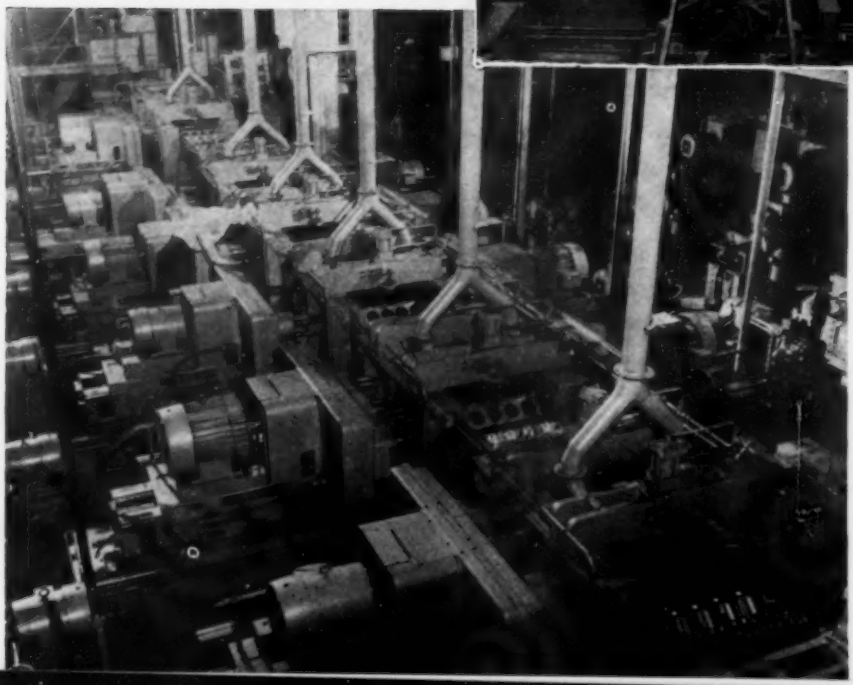
The gun drilling machines, which feature a high degree of accuracy, are approximately three times as fast as conventional drilling equipment, allowing one gun drill or bore to do the job of three conventional machines.

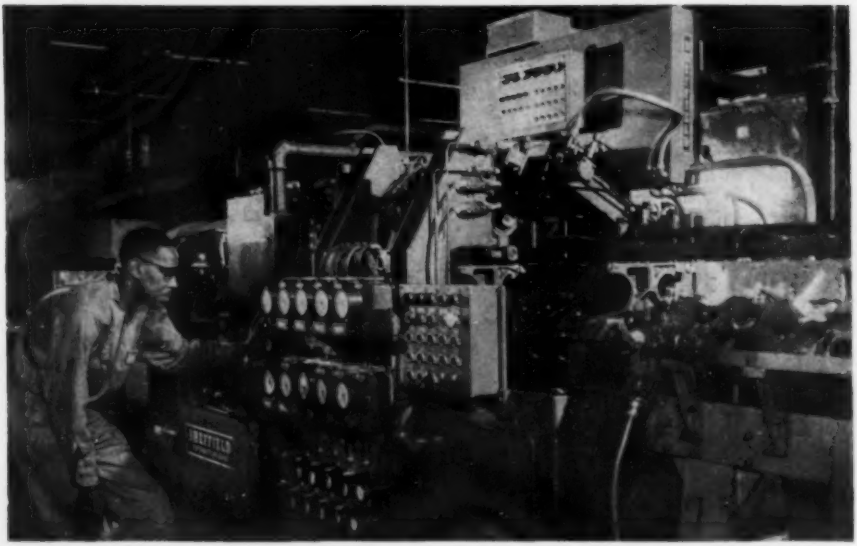
Another automation feature in the new plant is the extensive use of proximity switches to activate transfer equipment. The switches are relatively trouble free as they never come into direct contact with the machined part. Instead, the part passes over the switch and when a close tolerance is reached, the switch activates the equipment.

All automation equipment in the plant is hydraulically controlled. • • •

RIGHT: Batteries of drills automatically drill and ream valve guide holes in engine blocks. **BELOW:** Thirty-two separate drilling and reaming operations are performed on an engine block as it passes through 60-foot long transfer-type machine. Dust extracting tubes in the center remove all cast iron dust from the area.







This completely automatic gage checks various diameters in engine block and rejects blocks that fail to meet specifications.

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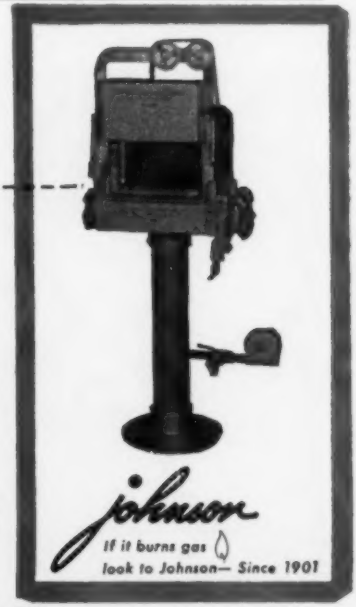
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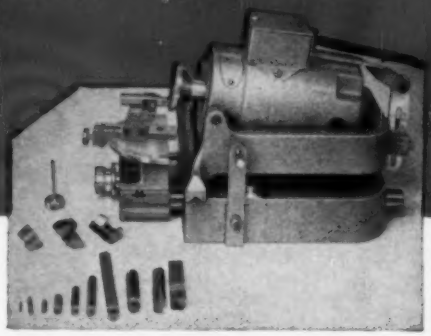
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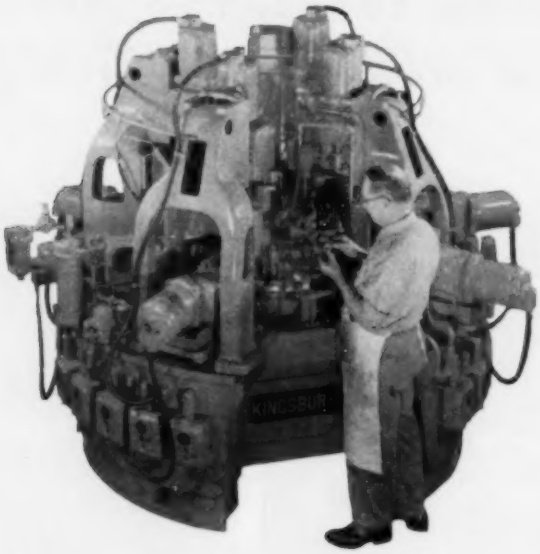
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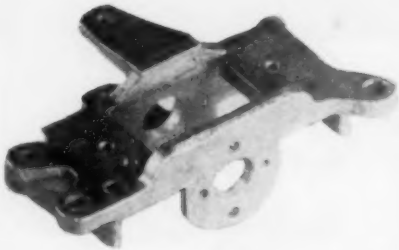


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A 24-inch index table holds eight work fixtures. The fixtures are clamped and unclamped while indexing by means of a cam mounted on the center stud. Each fixture holds one part horizontally with equalizing levers, locating against a flat surface and two cored holes. The part is difficult to hold because it is small and has holes on every surface.

Four vertical units drill two holes, ream three and tap three. Seven horizontal units drill six holes, ream one hole through two walls and tap three holes. The last unit taps two cored holes that are used for locating, so the locating pins are on a slide that retracts at this station.



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MODEL M-35A is equipped with a quickly adjustable positive-locking swivel head for cutting up to 45° in either direction, providing superior operation at a lower original cost than any other comparable machine. Positive geared-in-head drive delivers all of its power to cutting wheel. The machine is designed and built to give you long, trouble-free service under the most rugged conditions. Adaptable for wet cutting.

MODEL M-35B (12″ or 14″ Cut-Off Machine) has same capacity as Model M-35A. Straight edges adjustable for 90° or 45° cutting. Adaptable for wet cutting.

MODEL M-35 (12″ Cut-Off Machine) for 90° cutting has same capacity as Model M-35A.

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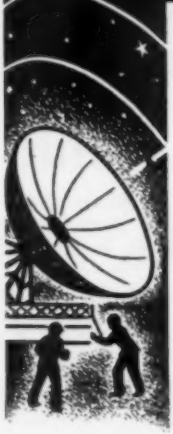
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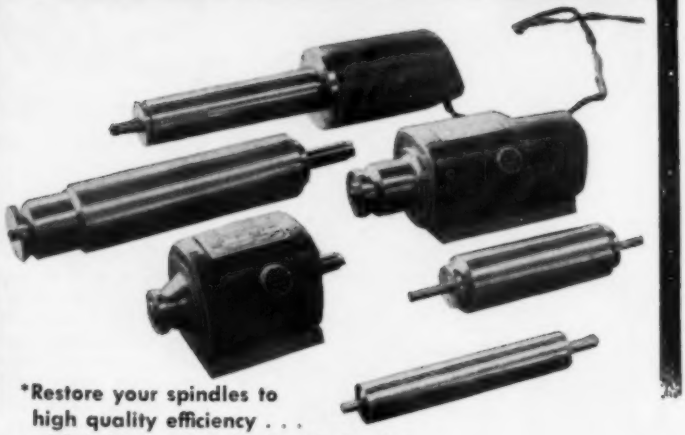
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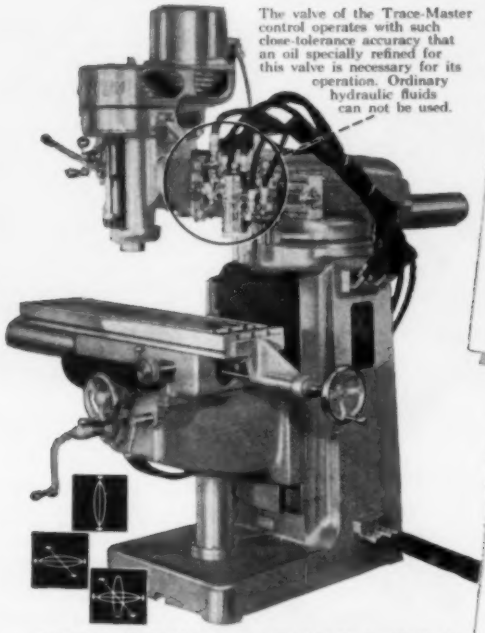
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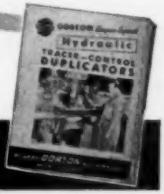
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now, **pre-set tools to accurate part dimensions outside the machine with this new Microbore® System**

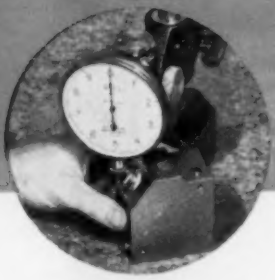


SIMPLE 4-STEP PROCEDURE

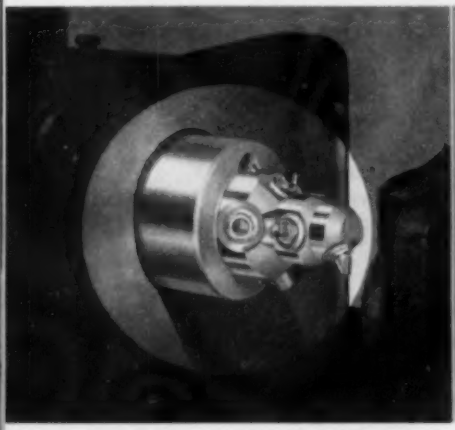
1. To set up pilot tool, insert Microbore "Pre-Set" unit in boring bar. Adjust to part dimension by trial cut and final setting using Micrometer Vernier adjustment.



2. Remove adjusted pilot tool from the boring bar and install in the standard Microbore setting block.



3. Position indicator anvil on high point of pilot tool in setting block and adjust indicator to zero.



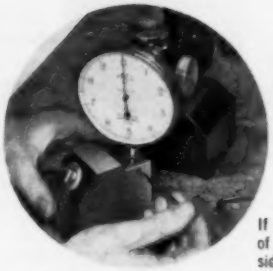
Eliminate trial cuts... change tools in seconds... simplify tool maintenance

Using a standard setting block and indicator, Microbore tools can now be pre-set to accurate part dimensions outside the machine and quickly locked in the boring bar or tool holder without further adjustment.

"Pre-Set" eliminates scrap parts due to trial and error set-up and greatly reduces down time for worn tool point adjustment. "Pre-Set" encourages the operator to keep sharp tools in the machine assuring greater accuracies and produces the maximum number of pieces per tool grind by minimizing breakage due to dull tools.

"Pre-Set" also makes it possible to replace worn tools without changing the entire boring bar or tool holder—eliminates the need for stand-by bars —simplifies tool grinding and maintenance.

Microbore System of "Pre-Set" tooling may be applied to boring, turning, facing and chamfering operations and is especially suited to production and automated operations where machines must maintain peak production on long runs. Write for complete information.



4. Adjust gage pin to same zero setting. Any number of additional tools may now be pre-set and interchanged with pilot for precision boring the same diameter.

If necessary to pre-set for depth of bore, tumble block to adjacent side and repeat procedure.

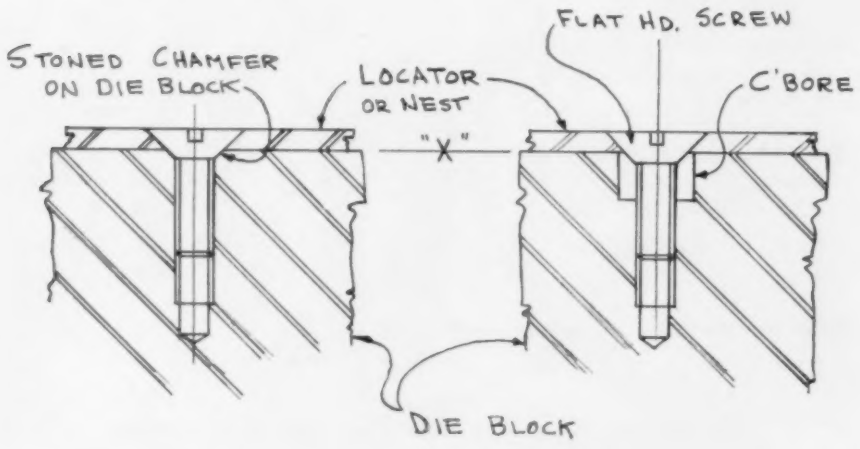
The DeVlieg Microbore System of Adjustable Precision Tooling includes Standard Microbore Boring Bars and Boring Bar Sets, Special Cluster Tooling, Flash-Change Tooling and Tool Holders, Flash-Change Replacement Bridgeport Spindles, Turret Lathe Turning Heads and Adjustable Boring Heads.

DeVlieg Microbore® System

DE VLIEG MICROBORE • DIVISION OF DE VLIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

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Counterboring Die Block Eliminates Chamfering

By **Cliff Bossman**

• In building a piercing die on which there are flat locators or nests for holding the work piece, it is necessary to countersink or stone a chamfer on the die block in order to provide clearance for the head of the flat head screw as shown in Fig. 1.

After surface "X" has been sharpened, it is necessary to restore the chamfer for screw head. We solve this problem when the die is originally built by the addition of a counterbore as shown in Fig. 2.

Using this approach, the die block may be used immediately after sharpening without adding the chamfer for the screw head. • • •

Friction Washer for Positioning Lid

By **F. A. Adams**

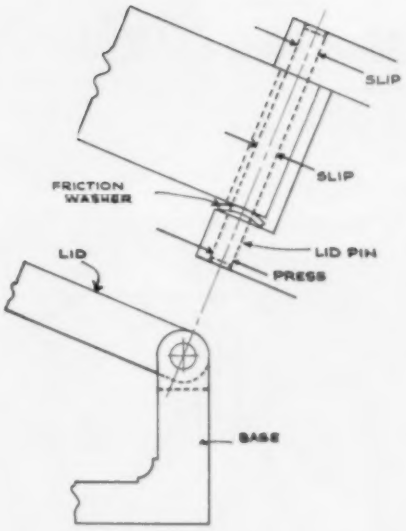
• We recently had to build a movable lid which could be moved to various angular positions for checking purposes. It was therefore necessary to devise a friction arrangement which would simply and adequately solve the problem. In the base was milled an opening somewhat wider than the width of the movable lid. In this clearance we inserted a bent standard washer as shown, after which the lid pin was pressed in position. The washer

Shop Hints

continued

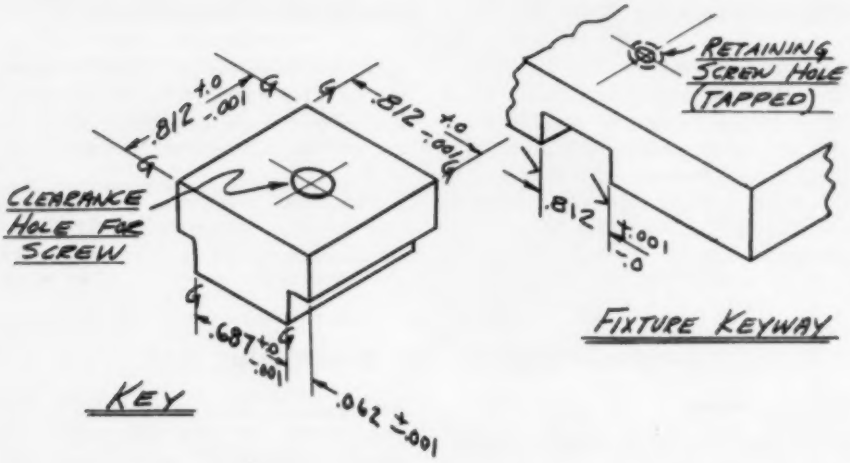
was formed in such a manner so as to exert just the proper amount of pressure on the lid.

This very simple remedy may be applied when a low cost method has to be employed. • • •



Right: Friction washer for positioning lid.

Universal Key for Machine Tool Fixtures



By **C. F. Brown**

• Here's an idea for a fixture key that has proven a real cost saver.

Most machine tools—such as mill-

Now, Star Band Saw Blades in New



Here's a new way to package band saw blades that makes handling, storing, and measuring a snap. It's Star's unique, unbreakable Reel-Pac containing 100 feet of blade.

To use, all you do is pull out the length you need — and cut off. If you pull out more than you need, you can easily slide it back in on the reel.

Spring tension of the blade won't distort this tough dispenser and there's no danger of blade fouling.

Your STAR distributor now stocks Star blades in the new Reel-Pac dispenser. Call him soon.

1 Clearly marked with blade size and type. Outline flexible back and gored teeth and skip tooth blades up to 1½" now available in easy to use and store Reel-Pac dispenser.

2 Free-running Reel-Pac of unbreakable material has special guard shield to protect hands and package from blade teeth.

STAR HACK SAW and BAND BLADES

Manufactured by

CLEMSON BROS., Inc. · Middletown, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Lawn Machines

Use postpaid card. Circle No. 288

ing machines—have one or two size key slots in the machine table: 11/16" or 13/16" wide. It is often desirable to key the fixture in such a manner that it can be readily located on either size table.

Place two hardened keys of the design shown in your fixture bases and the transfer from one machine to the other becomes a simple matter. Merely remove the key's retaining screw, turn each key 90 degrees, replace the screws and you're "in business" on any machine in the shop. Keyways in the fixture bases should all be 13/16" wide. • • •

Cut a KEYWAY in 1 Minute



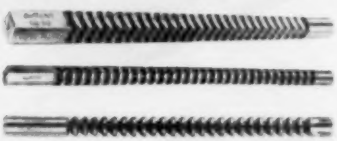
In one minute and for as little as one cent you can cut a keyway with a Minute Man Keyway Broach Kit. For Keyways from 1/16" to 1" in any bore from 1/4" to 3".

Save time with these other STANDARD STOCK BROACHES

SQUARE BROACHES
1/8" to 3/4" holes

HEXAGON BROACHES
1/8" to 3/4" holes

ROUND BROACHES
1/4" to 1" holes



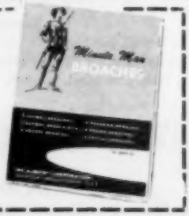
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MAIL FREE BROACH CATALOG AND PRICE LIST T describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

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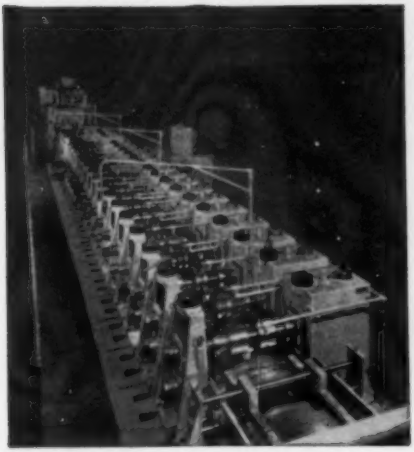
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Steel Roof Decks and Flooring cold rolled up to 200 f.p.m. on this mammoth



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ARDCOR

ROLL FORMING MACHINE



ARDCOR Roll Forming Machines feature: Unit Design—spindles in self-contained SEPARATE HOUSINGS, with speed reducers; Large Range of Vertical Centers; Double Bearing Design of Drive Housings; All Bearings are Anti-Friction; Micrometer Type Dials and Scales.

This entire automated production line is 15 ft. wide, 6 ft. high and 120 ft. long with total equipment weighing approximately 175 tons. Mill stands are completely movable, having 4½ in. dia. spindles with 42 in. roll space.

Fed by 20,000 lb. steel coils, the twenty-two roll passes form the 1½ in. deep by 2 ft. wide sections. The mill operator controls the loading, lining-up and feeding of the coil stock from a control bridge at entry of the mill. A 150 ton Straight Sided ARDCOR Press cuts off sections to proper lengths.

ARDCOR Roll Forming Machines are available in six standard sizes, other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and construction to produce them better . . . at greater speeds and profit!

Consult our Engineering Facilities, without obligation . . .

ARDCOR Engineered
MEANS BETTER COLD ROLL FORMING

American ROLLER DIE CORP.
29560 Clayton Avenue **Wickliffe, Ohio**

DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

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First COMPLETE LINE OF STANDARD END MILLS for ALUMINUM



For further information on Putnam End Mills for Aluminum, write for Catalog 457.



Again PUTNAM LEADS . . .

Standard End Mills . . . For the first time you can select from a complete line of **standard** end mills designed specifically for milling aluminum . . . Putnam stocks 185 **standard** types and sizes.

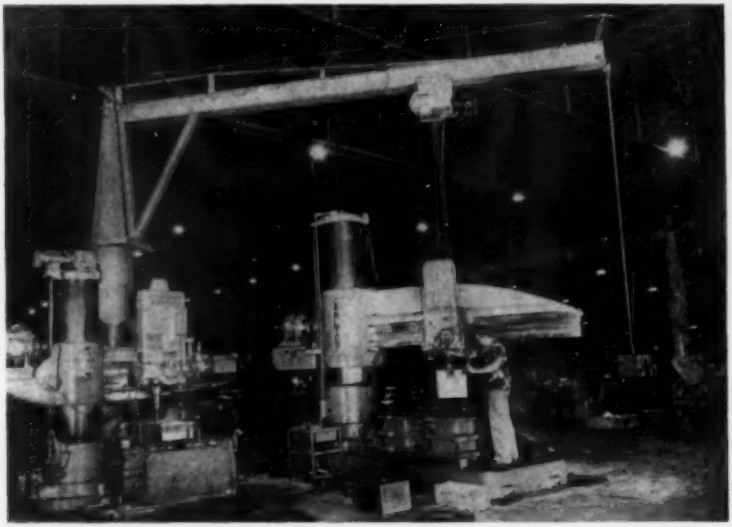
New Designs . . . These **standard** end mills have been developed through years of research and experience on aluminum applications. Over a year ago, Putnam introduced the first **standard** end mills designed for milling of aluminum. Today, no other manufacturer offers as complete a line of **standard** end mills for aluminum.

Contact your Putnam Distributor for personalized service, quick delivery of the finest standard end mills for aluminum.

PUTNAM TOOL COMPANY

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Over 100 of the company's own jib cranes are used in the LeTourneau plant at Longview, Texas. Most of the cranes are mounted in the center of vital production areas, like above.

Solving Own Materials Handling Problems Leads to New Line of Commercial Products

A leading manufacturer discovered that his shop equipment, which he designed to help build his commercial equipment, was just as marketable as the commercial equipment itself.

This is not a play on words—just the story of how a maker of heavy equipment was forced into developing a specialized line of materials handling tools for efficient production in his plants, and how these tools became new money-making products.

How It Happened—For many years R. G. LeTourneau, Inc. has designed and built heavy equipment for different industries. Many "firsts" are accredited to this pioneering company that "dared to be different."

Almost from the first, it was necessary to build special machines and equipment for making and handling the components of the massive machines. Gradually, tool after tool was designed because existing tools could

continued

not meet specialized production requirements.

By the time LeTourneau built the vast Longview, Texas plant, it had developed a unique line of heavy materials handling equipment.

How It Works—The Longview plant, with 540,000 sq. ft. of floor space, was designed as a tractor production plant with many versatile features. Its versatility was proven when it was completely converted to a special products operation, requiring production of such varied products as land clearing, logging, offroad transportation, marine and industrial equipment.

Utilization of materials handling equipment was given major consideration in laying out the plant.

All of the steel used by the company is produced in an adjacent plant at Longview. The mill is equipped with several crane and hoist teams, plus two company built bridge cranes like the one shown in the main plant.



Over 100 LeTourneau-built pillar and wall-type jib cranes, equipped with company-built, and a variety of other commercial hoists, form the backbone of the materials handling system. They perform the king-sized task of moving very heavy machine parts and supplies in every work area in the sprawling plant.

Fifty of these jib cranes, of six ton capacity, are installed in the center of major manufacturing sections. These cranes cover some 75 per cent of the total production area. Each crane, capable of 360 degree continuous rotation covers 1,963 sq. ft. of floor space.

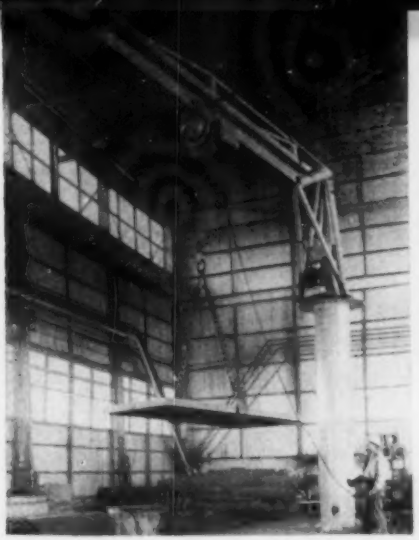
Many smaller pillar jibs and wall mounted jibs are scattered about the plant to complete the well-balanced work team. Workmen can easily move materials in their own area without waiting for handling equipment to move in from other areas.

For heavier materials and for distance moving, a 100 ton capacity overhead bridge crane is called into play. This 110-ft. crane, also designed and built by LeTourneau, extends across the width of the main assembly part of the plant. Two other LeTourneau bridge cranes, of 100 and 150 ton capacities are used in the steel mill that is adjacent to the main plant.

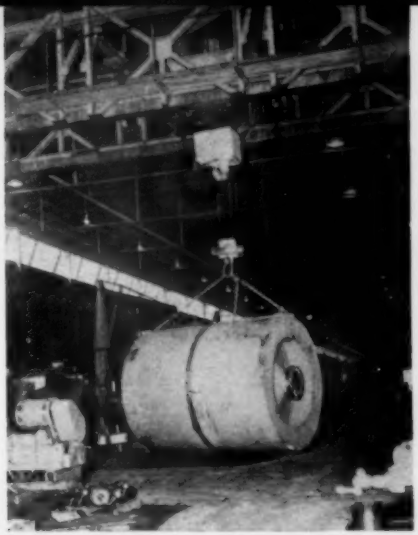
Time studies readily proved many advantages to this materials handling system. Efficiency of the jib crane and hoist teams deployed in every work area is in the following:

20% lower installation cost

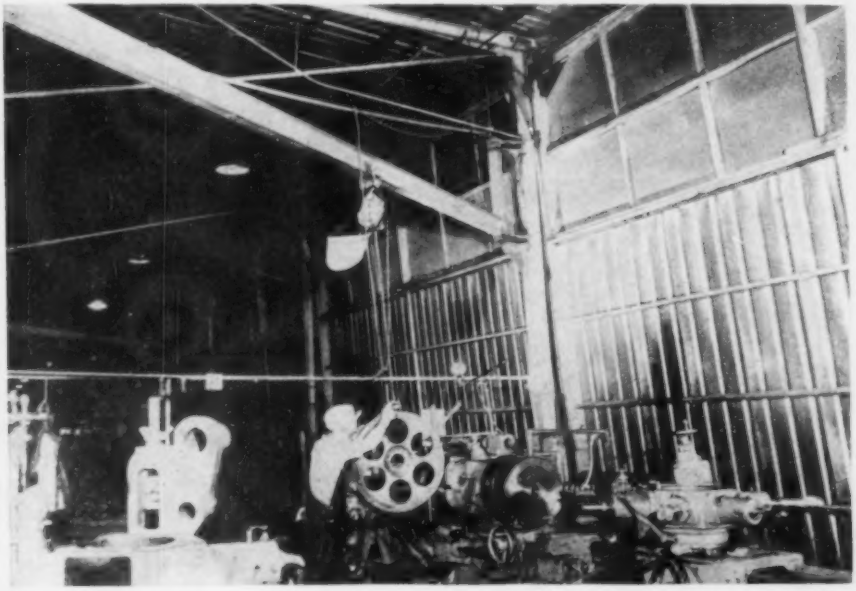
32% less time down waiting for



Where tough hoist and swing problems are encountered, inconvenient for bridge cranes to handle, company built power-rotated jib cranes are installed.



A 100-ton capacity bridge crane, company built, handles extremely heavy materials and is used for distance moving. This 110 foot crane spans the main assembly



Wall-type jib cranes are used in the plant to cover areas that are not practical for larger cranes. Many are equipped with commercial hoists much smaller than ones built by the company.

continued

other materials handling equipment
40% increased efficiencies of process
21% less personnel injuries

The jib cranes and hoists proved so successful in the LeTourneau plant at Longview and also in a sister plant at Vicksburg, Miss., that the company started making them available to other concerns with similar problems. Now, the company markets a complete line of hoists and jib cranes, in addition to its mobile cranes. They have been widely accepted by various industries.

Precision Control—All of the jib cranes in this giant plant were made by the company, but the hoists used on the cranes represent many other commercial lines of hoists. This wide variety in types and sizes of competitive hoists was selected for several reasons. Primarily, they were chosen for comparison tests with LeTourneau hoists.

Due to heavy lifting requirements, the capacity of the LeTourneau hoists starts where most commercial hoists leave off. Although available in capacities as low as three tons, most of the hoists sold are in capacities of 5 to 50 tons and up.

Ability to lift heavy loads is but one of the unusual features of the LeTourneau "Big Lift" Electric Hoists. Perhaps the most amazing thing is precision load control. Full capacity loads can be moved up or down as little as .008 of an inch. This positive control results from the combination of a varying-speed a.c. motor which deliver maximum torque instantly, and a specially designed dual braking system.

The hoists are made with different types of mountings to make up a complete commercial line. Mobile mountings include motor, hand geared and plain trolley, while stationary mountings include hook, lug and deck.

Rest Of The Team—Close companions of the "Big-Lift" hoist are the LeTourneau jib cranes ranging in capacities from 3 to 15 tons. They are made with different boom lengths and are available with either power or manual rotation. Both types feature 360-degree continuous rotation and the powered model is geared to operate at less than one-half revolution a minute in either direction, when precision handling of heavy loads is required.

LeTourneau hoists and jib cranes, used separately or as a team, are operating in many different industries, solving all kinds of unusual materials handling problems.



A New Lucas Lathe



Fully-automatic Tape Control, Tracer Control or both. Infinitely variable speeds and feeds. Automatically-maintained, constant-cutting speeds on changing diameters. Console control from moving operator's platform. *Three* hardened and ground ways. Self-contained Motor Generator Set.

The Lucas Lathe — perfect for your large, lightweight, close tolerance, intricately-shaped problem jobs. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

Lucas Tape and Tracer Control



Lucas Tape and Tracer-Controlled Machines offer the advantage of maximum flexibility of operation to suit changing job requirements. All models can perform:

- pendant-controlled boring, drilling and milling
- Numerical Positioning Control, automatic cycle boring, drilling and milling
- pendant-operated contour tracing
- tape-controlled, automatic cycle contouring

These features include punched tape or magnetic tape controlling: head, table, saddle, horizontal rotary table, vertical rotary table and spindle speeds. For tool room work — for precision production, only Lucas Tape and Tracer Control offers so much flexibility in one machine. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

continued

Heat Program Timer Simplifies Welding of Small Assemblies

WALTHAM, MASS. — The problems associated with the resistance welding of small assemblies such as are commonly encountered in tube manufacture are in many instances easily solved by a new small and compact **Heat Program** Timer, developed by Raytheon Manufacturing Co. This is the first specially designed device available for use with low power bench welding equipment under 5 kva capacity.

Raytheon itself is finding much use for the equipment. In its Missiles Systems Division, for example, the timer is being used to weld Kovar to molybdenum for magnetron tube heater leads; also in the tweezer welding of nickel tubing to nickel wire.

In one application, three metals—alumel, chromel and aluminum—are being joined in a single weld on a thermocouple.

The timer provides a controlled gradual increase in current just before the weld period and a gradual decline in the current after the weld period, as follows:

1. Up slope time or "conditioning" phase during which the material surface is prepared for satisfactory welding by reducing the irregularities of the coating, oxide or dirt, permitting subsequent welding to take place reliably. This is adjustable over a range of 2 to 10 cycles.

2. Weld time or welding phase, the actual welding time which is synchronously controlled and adjustable over a period of 10 cycles.

3. Down slope time or "annealing" phase during which the crystal growth is inhibited, thus having a tendency to reduce the brittleness surrounding the

Raytheon's new Timer automatically controls amount of current passed to welding head. Current intensity and duration for each phase are pre-set by means of control knobs on the front panel. Once this has been done, the Timer repeats the heat program precisely and automatically without further adjustment.



continued

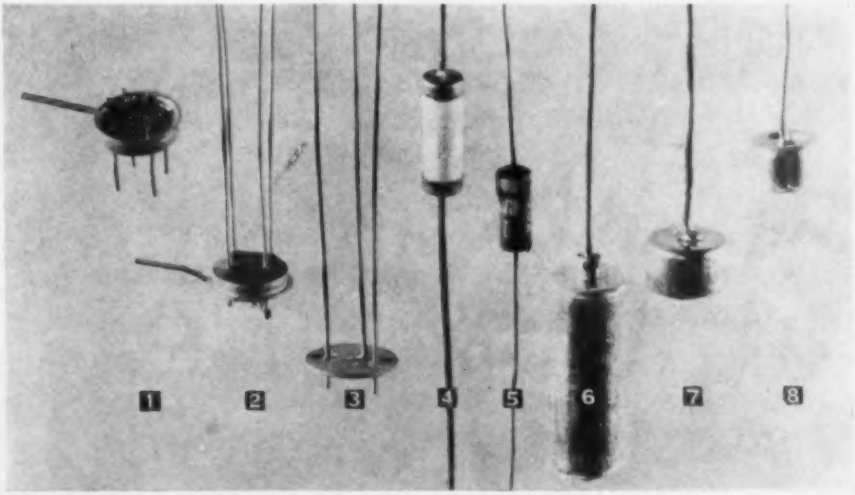
weld. This is also adjustable over a 2-10 cycle range.

The timer is incorporated in a complete welding equipment and provides for the first time, automatic heat control in the precision welding of small parts.

Weld heat is varied in a pre-established sequence during the welding cycle to produce successful welds previously considered impractical or impossible between oxidized, greasy, or otherwise coated metal surfaces in applications involving small metal parts and wire fabrication.

The timer is especially valuable in the spot welding of copper to copper. Generally considered difficult due to the relatively low resistance of the metal at ordinary temperatures, with this unit it is now possible because of the pre-heat or conditioning feature, to raise the normal resistivity of copper, which is approximately 2.5 micro-ohms per cm. at 400 degrees K., to 8 micro-ohms per cm. at 1200 degrees K. Under these latter conditions an excellent weld can be made.

In the manufacture of electronic components, the timer has made it much easier to pigtail weld tinned copper wire to nickel-iron cups which are used in large quantities in the manufacture of resistors, diodes and capacitors.



Small metal parts joined by the new Timer control are identified from left to right as follows: **1** and **2**, tinned copper to nickel-iron cup; **3.** Tinned copper to aluminum shell (for capacitor); **4.** Diode assembly; **5.** Tinned copper to nickel-iron cups on resistor assembly; **6.** Center wire is tinned copper welded to kovar disc (for semiconductor package); **7** and **8.** Nickel tabs to tinned dumet wire (for semiconductor package).



production: 10,000,000 cuts
maintenance cost: $896.00

This Cincinnati Shear has been in constant service for ten years, cutting 18-gauge corrugated sheet, 1010 draw quality, for a prominent heating equipment manufacturer at an average rate of 4000 cuts a day. That adds up to more than a million strokes per year—or 10,000,000 strokes in ten years.

Accuracy has always been excellent. The machine has been "down" only for blade changes. Special blades are used in this operation, to eliminate distortion of the corrugations.

Cost of machine maintenance, including blade resharpening, has been $896.00 for the entire ten years. "This," says their production manager, "to my way of thinking, is very good performance." We agree. Yet this is not exceptional. Every Cincinnati Shear is built to provide this kind of dependability and low maintenance, and we have hundreds of case histories to prove the point.

Specify Cincinnati for all your shear requirements. Write Department H for Catalog S-7R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

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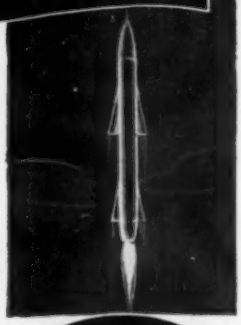
In another instance, difficulty was encountered by tube manufacturers in welding carbonized nickel plates to themselves and to nickel side rod supporting structures. Formerly the high-resistance carbon surfaces had to be removed prior to welding by time-consuming expensive processes. With the Heat Program Timer these welds are made directly using the carbon coated parts. This results in substantial savings and superior tubes.

Other interesting applications reveal that the Heat Program Timer is being used to solve the problem of welding hot tin-dipped superflexible stranded copper wire to bare copper lugs.

To help manufacturers with their problems, at no cost to them, Raytheon now maintains a completely equipped welding laboratory for analyzing and processing samples. • • •

...from horse cars to rockets





An impressive record since 1872

manufacturing

the Quality Line

STEEL Stanho PRODUCTS

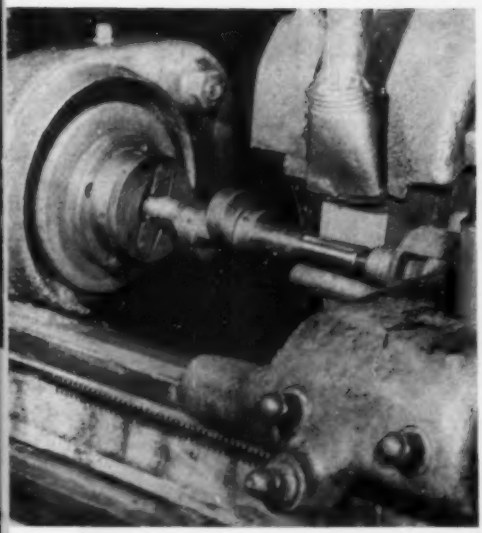


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STAN-HI-PRO KEYS • STRAIGHT PINS
WOODRUFF KEYS • COTTER PINS
MACHINE RACK • SPECIAL PARTS

Since the days of horse cars "Stanho" has come a long way in serving industry. Today's "rocket-age-needs" call for the precision-quality of Stanho Steel Products. Available also in other metals. Bulk or packaged. Write for details.

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Since 1872
NEW BRIGHTON, PA.

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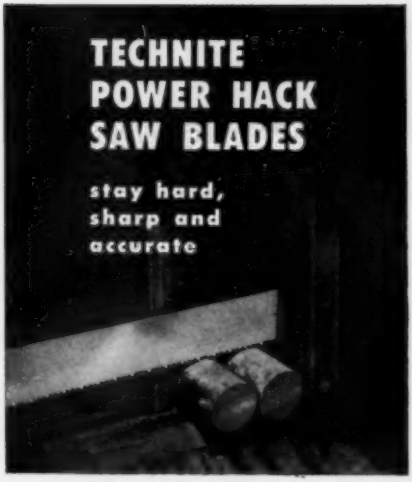


Work Drivers Increase Production at Carrier

● Crank shafts for Carrier Corporation's hermetic compressors are ground—motor end and main bearing—on two cylindrical grinders. Use of Seneca Falls Machine Company's Work Drivers on both grinders has reduced direct labor costs by enabling one operator to handle grinding operations on two machines.

The Seneca Falls' Work Drivers eliminate dogging and have six seconds per piece on an 18 second machine cycle. Self-centering work drivers have serrated jaws which tighten automatically on the work—the harder the pull, the tighter the grip. Work Drivers may be used on any type of engine lathe, multiple tool lathe and on plain or universal grinders for work diameters from ¼" to 6⅞."

• • •





See Your Capewell Distributor

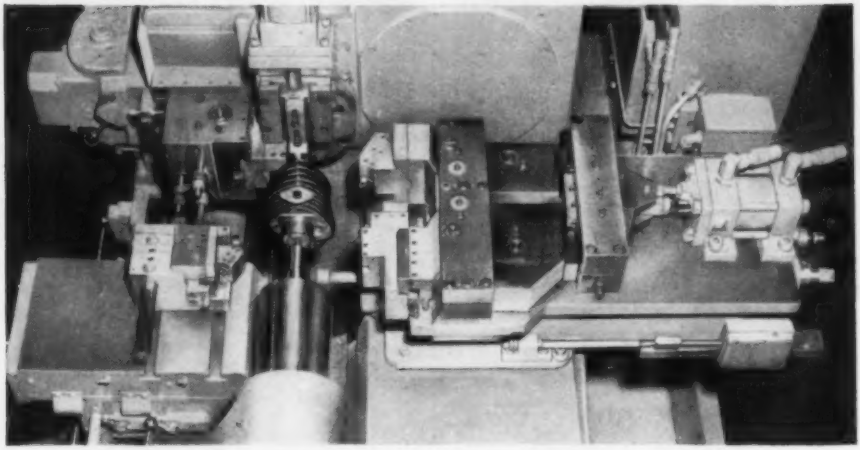
CAPEWELL

THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

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Six different sizes and types of workpieces are handled easily on this job. Extra expanding mandrel and sleeves at right are for different sizes.



How Harley-Davidson speeds motorcycle part production

Machines both ends in single chucking, using Gisholt No. 12 Automatic to get maximum accuracy, cut production costs

This well-planned setup reveals how Harley-Davidson Motor Co., Milwaukee, Wis., is handling cast iron front and rear cylinders.

Smart tooling on a Gisholt MASTERLINE No. 12 Automatic Production Lathe handles 6 different sizes and types of workpieces. Change-over is fast and easy. A special headstock-mounted, air-operated locating stop speeds work handling.

While tools in the front carriage turn and chamfer at one end of the piece, tools in a headstock-mounted auxiliary slide chamfer the I.D. on the other side. Simultaneously, tools on the rear slide face both ends for length. At the end of the cut, tool blocks on the rear independent slide swing open automatically to provide tool relief before withdrawal. Floor-to-floor time on the part shown is 1.2 minutes, only 1.8 to 3.6 minutes for the other 5 workpiece types and sizes.

The new Gisholt MASTERLINE No. 12 Automatic Production Lathe is designed specifically for high production operations; yet, it is flexible enough to handle a variety of similar parts in small repeat lots. The automatic cycle frees the operator to handle other machines or do other work.

Make a note to phone your Gisholt Representative today. Ask him to come in and show you where the fast automatic cycle and flexibility of the No. 12 Automatic Production Lathe can cut your floor-to-floor time and reduce your costs.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE No. 12 Automatic Production Lathe. Ask for Form 1178.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

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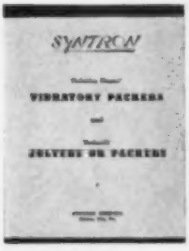
To receive copies of booklets described below, simply circle corresponding numbers on one of the handy postage-free Action Cards found opposite pages 64 and 192.



(See Number 1)



(See Number 2)



(See Number 3)

1. Motorized Spindles. Catalog S-58 contains descriptive information and illustrations of motorized spindles from ½ hp to 10 hp. Belt driven spindles, feeds, slides and a complete line of accessories are also illustrated and described. The Cincinnati Electrical Tool Co., 359 Mt. Hope Ave., Cincinnati 4, Ohio.

2. Die Stops. Folder describes retractable die stop pins for compound dies, designed for stripper plates, draw rings, and oil breakers. The primary finger die stop can be installed by an apprentice, as no accurate holes need be drilled. Cutoff die stops and automatic die stops are also described. Specifications include sizes or quantities and prices. Keystone Engineering and Manufacturing Co., 122 S.W. 16th St., Des Moines, Ia.

3. Vibratory Packers and Jolters. The manufacturer announces the availability of a four-page catalog section on their pulsating magnet vibratory packers and hydraulic packers and jolters, which are said to increase the net content of containers as much as 20% to 30%. Complete descriptions, data and specifications for eight standard electro-magnetic vibratory packers and two standard model fluid-power jolters or packers are given. Syntron Co., 300 Lexington Ave., Homer City, Pa.

4. Abrasive Cutting Center. Folder DH-20 describes the Allison-Campbell new demonstration laboratory. The full complement of Campbell abrasive cut-off machines—the chop stroke, oscillating, horizontal and rotary types for dry, wet or submerged abrasive cutting processes and the complete line of Allison abrasive wheels—are displayed. Solid bar stock and structurals up to 12" x 12", plate up to 4" thick, and pipe or tubing up to 8" O.D. can be cut in a matter of seconds, according to the folder. The manufacturer recommends methods, machines and wheels for abrasive cut-off problems. Companies are invited to submit samples of stock and/or witness cutting tests. Allison-Campbell Division, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

5. Dial Indicator. Boice Gages introduces their dial indicator as the only completely gearless indicator built to A.G.D. Standards. The instrument is shown clearly diagrammed. The hand responds to minute movements of .00002 or better, according to the flyer available, and the dial and pointer permit accurate readings without chance of error due to parallax. Boice Gages, Hyde Park, N.Y.

6. Swiss Universal Micrometers. Folder describes the Polyplan micrometers, recently perfected in Geneva. The instruments, of several types, with a reading of 1/10,000th of an inch, measure from 0-1", 0-2", and 0-3". All have five interchangeable anvils. A sturdy plate enables them to stand upright, providing facility of operation. Illustrations are given of the micrometer in various uses. Specifications are included. Polyplan Co., 45 W. 81st St., N.Y. 24, N.Y.

7. Metal Marking Equipment. The Numberall rotary stamps (single wheel), the two wheel rotary steel stamps, multi-wheel numbering machines, numbering machines with one wheel or two wheel quick change feature, and automatic indenting numbering heads are among the products listed in recent catalog. Illustrations are given, with sizes and prices included. Numberall Stamp & Tool Co., Huguenot Park, Staten Island 12, N.Y.

8. Linear Actuating Equipment. Application data handbook describes the Inchworm Motor Type 202 as a linear actuator to fulfill the need for a powerful feed mechanism accurately controlled in increments of millionths of an inch. It is being used as a control for throughfeed centerless grinders. The motors are being used manually operated under direct operator control, or they can be incorporated into completely automatic closed-loop systems. A single operating cycle diagram is given, as well as outline and installation dimensions and load characteristics in diagram and chart form. The modification kit, control panel and heavy force armature are also described. Airborne Instruments Laboratory, Inc., 1345 New York Ave., Huntington Station, N.Y.

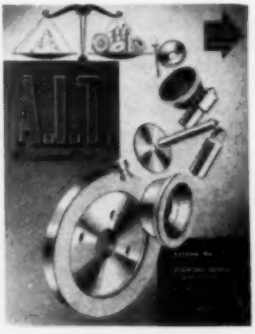
9. Universal Chuck for Cylinder Grinding Wheels is described in folder available. A simple turn of a Jacobs key locks the wheel on-center. The chuck is said to prevent vibration and chatter, eliminate sulphuring, and permit wheel changes in seconds. It exerts equal pressure on all jaws. The chuck automatically centers the grinding wheel with the spindle as the jaws tighten against the grinding wheel. It is available in sizes to accommodate all standard wheels from 6" to 20" diameter. Instructions are given for ordering. Lindgren & Sons Machine, Inc., Groton, Mass.

10. Component Parts of Jigs and Fixtures are diagrammed, with specification tables for different sizes included, in 24-page catalog. Items as L pins, T pins, angle brackets, clamp rest screws, coupling nuts, C washers, knurled nuts, clamp assemblies, clamp straps, diamond pins, are among the numerous products illustrated and described. Carr Lane Manufacturing Co., 4200 Krause Court, St. Louis 19, Mo.

11. Bench Type Oscillating Grinder. According to recent brochure, the GF-O grinding and lapping machine was designed for use with the manufacturer's Neven diamond impregnated wheels, ensuring a high quality edge on a tungsten carbide lathe tool in a short time by an unskilled operator. A carefully designed



(See Number 10)



(See Number 12)

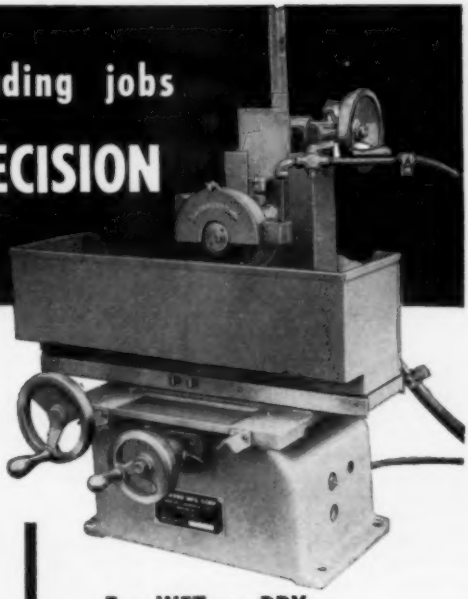


(See Number 13)

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SURFACE GRINDER

This unrivalled small parts grinder can be depended upon for micro accuracy. It's easy to use too . . . every hand wheel and operating switch is at your finger tips.

Designed and built by engineers and tool makers of rare foresight for tool, die and gage work, it has been constantly preferred after these many years of proven worth.

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For WET or DRY grinding, specify optional equipment.

PARTIAL SPECIFICATIONS —

Chuck Surface — 3" x 5" or 4" x 6".
Table travel — 8", traverse 4".
Vertical head movement — 6".
Work area under 4" wheel — 6", with chuck — 4".
Standard grinding wheel — 4" x 3/8" x 1/2".
Spindle speed — approx. 5500 RPM.
Motor, 1/6 HP, single or 3 ph., dynamically balanced.
Dimensions — 23" x 30" x 27" high.
Net wt. approx. 160 lbs.

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reversible guard gives maximum access to the wheel, and restricts spray from the coolant giving clean operating conditions. The 1 hp motor rotates at 2,850 rpm. Total indicator reading is within .0005". Construction and operational features are given, with dimensional drawings. Extra equipment includes a single door cabinet, and protractor scale to fit in table face. The Wickman Manufacturing Co., 10325 Capital Ave., Oak Park (Detroit 37), Mich.

12. Diamond Wheels and Tools. Types of diamond wheels as straight, flaring cup, plain cup, and dish are clearly diagrammed and numbered for identification in recent catalog. Specification tables, for ordering, give the wheel number, diameter, thickness, hole size, etc., on all the diamond wheels. Diamond wheel shapes, for off-hand to fixed grinding, are given. Grit size recommendations are included, as well as bond hardness. The Al-Aloid wheel grinds carbide .005" to .062" in one pass in seconds. A recent price list is enclosed with the catalog. A.I.T. Diamond Tool Co., 8221 N. Kimball Ave., Skokie, Ill.

13. Dry Abrasive Cutting Machine. The four-page folder DH-106 describes the Model 1-A Sever-All, which is said to cut practically all metals—solids up to 2" square, pipe and tubing up to 3½" O.D., angle iron up to 3x3" and channels up to 4". Specifications such as rated capacity, power required, cutting wheel diameter, dimensions and weights are listed. Optional accessories, for angle cutting and repetitive cutting, have been included. Allison-Campbell, American Chain & Cable Co., Bridgeport 2, Conn.

14. Die Casting Machines. A recent catalog describes and gives specifications of the manufacturer's universal high-pressure hydraulic die casting machines. Models 50, 200, 400-N, 500-N, 650, 800 and 1000 represent machines ranging in locking pressures from 50 to 1000 tons, and able to produce any size casting. The machines incorporate hot chambers for casting zinc, lead and tin, and cold chambers for casting aluminum, brass and magnesium. The Cleveland Automatic Machine Co., Cincinnati 12, Ohio.

15. Power Drilling and Checking Fixture. As described in flyer, the M-M Check is not only a checking fixture, but can be used as a grinding fixture for grinding any combination of slots, squares, and hexagon. It has 24 equally spaced slots for checking angles on any degrees. The unit may be motor driven or hand operated. The Model S-24 is made for applications that require less accuracy, with tolerance of .002. Model P-500 is designed for close tolerances, with .0003 accuracy claimed. M-M Tool Mfg. Co., Dayton 2, Ohio.

16. Precision Gages. Jo-Plugs, for checking center distances between various sized holes, are described in recent flyer. The gaging diameter is reported as constant, regardless of the threaded hole size. The gages come in standard sizes from No. 4 through 1" diameter, with National



(See Number 17)



(See Number 18)



(See Number 19)



The concentricity of two diameters may be checked easily with greater accuracy with this unit.

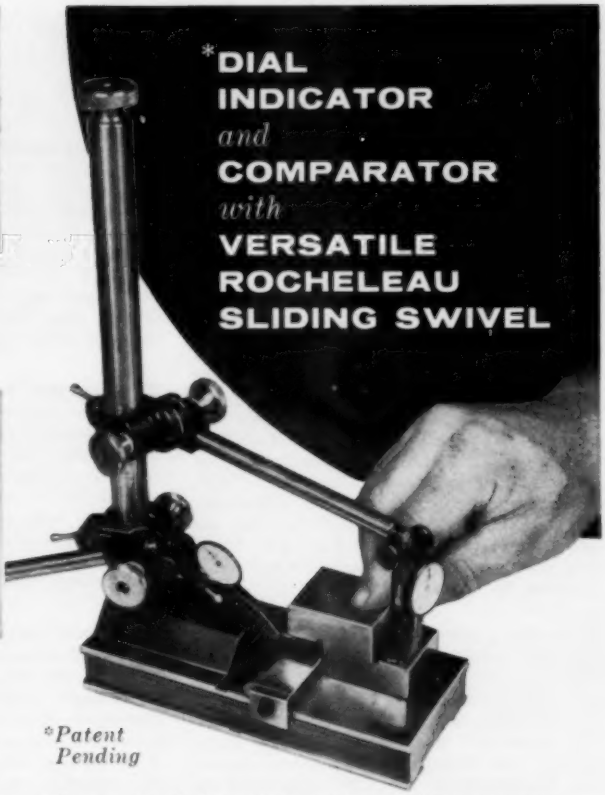


This unit is also widely used as a Universal Surface Gage. The important Sliding Swivel feature gives you extra fine adjustment for accurate settings.



Model B Sliding Swivel used on this unit comes in various hole size combinations to fit all base and indicator rods.

*DIAL INDICATOR *and* COMPARATOR *with* VERSATILE ROCHELEAU SLIDING SWIVEL



**Patent Pending*

This new Rocheleau Dial Test Set and Comparator has a wide variety of applications and is a proven time-saver for inspectors, toolmakers and set-up men.

Smooth, positive positioning of the dial indicator is readily accomplished without disturbing the other rod setting and final precise positioning is made accurately.

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Coarse and National Fine ground threads. Special threads are available on order. The instruments are made of Graph-Mo tool steel with hardened and ground threads to class 3 tolerances. The gaging diameter is a uniform .200" through the entire range of sizes. Specifications are given for ordering. Spence Industries, 6910 Chase Rd., Dearborn, Mich.

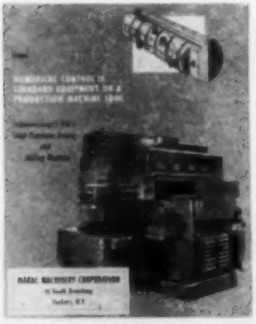
17. Helixpoint Drills, as produced on the Steptool relief grinding fixture, feature self-centering and free-cutting action, according to bulletin. Better hole roundness and straightness is claimed possible. Lip concentricity and indexing are said to be held within .0003". The bulletin covers two case histories of performance and describes the grinding fixture used for grinding Helixpoints on drills from No. 80 through 1" diameter. 3/8" drills can be ground at 120 per hour. The fixture also permits sharpening core drills, stepdrills, countersinks, and taps, and is used on any surface grinder or tool grinder. Steptool Corp., 3613 E. Olympic Blvd., Los Angeles 23, Calif.

18. Surface Grinder. The Harvel No. 1016 surface grinder is described in recent folder, with diagram of measurements and also specifications included. The alloy steel spindle is heat treated and ground and mounted on super precision preloaded ball bearings, completely sealed and lubricated for life. The table working surface is 10" x 16", and it accommodates any chuck up to a full 160 sq. in. of surface area. All feeds are by hand. Specifications include 1750 rpm spindle speed, and 1 hp direct motor spindle drive. Harvel Co., 5135 Coffman-Pico Rd., Pico, Calif.

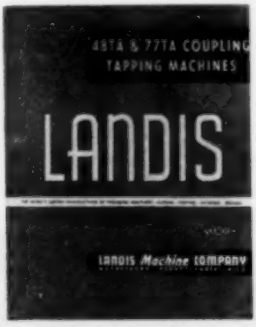
19. Steelweld Hydraulic Press Brakes are described in catalog No. 2024A. Construction details and clearances—dimensions and specifications—are given for the machines. Diagrams illustrate features claimed for the brakes, such as positive overload protection, ram reversible at any point, and stroke adjustment for any length. The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

20. "How Do You Pick A Cutting Oil?" is title of folder from Sun Oil Co. which makes soluble or straight, transparent or black, light or heavy duty cutting oil for the customer's job. Cutting oil specialists and metallurgical technicians are ready to help the customer. Listed with order card are the various technical bulletins offered. Industrial Products Dept., Sun Oil Co., 1608 Walnut St., Phila., 3, Pa.

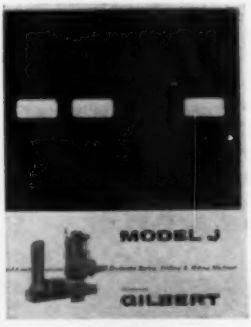
21. Numerically Controlled Boring and Milling Machine. The Schwartzkopff KBF-2 boring and milling machine is described in 12-page catalog as combining production-room ruggedness with near jig-borer accuracy. Numerical control is offered as standard equipment. Numerical dials or punched cards control all machine operations—drilling, boring and milling. All machine movements are measured precisely by means of mechanical gage



(See Number 21)



(See Number 24)



(See Number 25)



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MOLYKOTE® EP

PROVEN TO EXCEL IN THESE APPLICATIONS	BENEFITS
Press Fitting (Wipe or brush on parts to be fitted).	Reduces force required to assemble; eliminates distortion and danger of galling; allows easier disassembly where required.
Machine Tool Ways & Guides (Lightly wipe or brush on. Remove all excess).	Reduces chatter or stick-slip.
Dead Centers & Steady Rests (Squeeze on from tube or brush on).	Eliminates necessity for frequent relubrication during turning operation.
Lead Screws (Squeeze on from tube or brush on. Avoid excess).	Reduces wear.
Power Screws (Brush on sparingly).	Reduces power required to drive; reduces wear.
Lathe Chucks and Collets (Brush on sparingly).	Increases holding power; reduces sticking; insures easier release.
Splines (Brush on).	Prevents fretting and reduces wear.
Tapered Fits (Wipe on with cloth).	Easier to assemble and release.
Plug Gages (Wipe on with cloth).	Increases life; easier to release.
Punching Operations (Brush on work or punch).	Increases punch life.
Cams (Brush on).	Reduces friction and wear; especially useful during wear-in.
Tapping & Drilling (Brush on drill or tap)	Increases drill and tap life; allows holding of closer tolerances; eliminates tearing and improves finish; exceptional advantages in working stainless steel, beryllium, copper, zirconium, titanium, uranium.
Plain Bearings (Wipe on or apply with grease gun).	Significant increase in life on heavily loaded bearings.
Running in of Sintered Bearings (Squeeze on from tube or brush on during assembly).	Eliminates initial tendency to score.
Threaded Connections (not exposed to temperatures over 325° F.) (Brush on).	Less make-up torque; easier breakaway; minimizes galling and seizing.
Forming Dies (Brush or wipe on).	Increases die life; reduces metal pickup.
Packings (Squeeze from tube into stuffing box).	Reduces wear on stem and packing; reduces scoring of shaft; insures positive sealing for longer periods.
Die Guide Posts and Bushings (Wipe on with cloth or apply by grease gun).	Reduction in wear; eliminates necessity for frequent relubrication.

NOTE: Not suitable for use in Ball or Roller Bearings.

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rods. More than 30 illustrations describe the design and operation of the machine, which is made in the West Zone of Germany and imported by Marac Machinery Corp., 45 South Broadway, Yonkers, N.Y.

22. "The Eight Steps to Risk-Proof Alloy Steels" is the title of booklet which outlines an 8-point plan to give added protection to buyers of alloy steel. It in effect removes uncertainties over mechanical properties that may be obtained, and lessens the need for users to set up their own checks and tests. The key to the customer benefits is the Ryerson Certificate of Analysis and Hardenability which accompanies every shipment, and which is reproduced in the booklet along with an explanation of the end-quench hardenability test that is given all as-rolled and annealed alloy steel selected for Ryerson stocks. Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.

23. Dial Gages. Flyer describes how the manufacturer produces several types and sizes of dial gages by building a number of gages around one dial indicator housing. Because the gages are furnished in distinguishing colors, each department can now identify its gages. Bore size extensions for the dial bore gage are available in a variety of sizes and are reported to permit checking bores up to 2' in diameter. The right angle dial bore gage and the dial snap gage are also pictured and described. Cavalier Gage Co., Poughkeepsie, N.Y.

24. Coupling Tapping Machines. The Landis 48TA and 77TA coupling tapping machines are discussed in Bulletin No. E-98-1. Operating features are pictured and described, as well as design features of the bed, magazine, loading mechanism, automatic work stop, headstock, etc. The 77TA machine is designed for the high production precision internal threading of oil tubular and commercial couplings ranging from 2⅞" drill pipe external upset to 9⅝", long thread, casing couplings. Ten spindle speeds ranging from 7 to 56.8 rpm, are obtainable by changing the vee belt drive pulleys when using an AC constant speed motor. The machine can be supplied with either an AC mechanical vari-drive or DC variable speed motor allowing adjustable spindle speeds, ranging from 4.5 to 54 and 6.5 to 53.5 rpm respectively, to be obtained. One page is given to complete specifications. Landis Machine Co., Church and Fifth Sts., Waynesboro, Pa.

25. Horizontal Boring Mills. Bulletin 1157 describes 4" and 5" table type horizontal boring, drilling, and milling machines. The pendant control feature is summarized and illustrated, as well as parts as the bed, column, saddle and table. The machine offers pre-selective speeds and feeds with power automatic shift. 27 speeds, up to 1500 rpm, with only 18 gears, are claimed. The feed distribution is described as 24 milling feeds for each of 27 spindle speeds, or 648 separate milling feed rates in ipm to table, saddle, and head. Up to 25 hp motors are available. The Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.



(See Number 26)



(See Number 31)



(See Number 33)



New L&J SINGLE CRANK STRAIGHT SIDE PRESS

STANDARD EQUIPMENT

Air clutch and brake. Four square type gibs with bronze surfaced ways on ram. Hard bronze crankshaft bushings and ball seat. Ram counter-balances. Forced lubrication, J.I.C. controls, etc.

Write — Bulletin L-18 on 20 to 150 ton single and double crank straight side presses . . . also, 30 to 75 ton gap frame presses.

- **150 ton capacity adaptable to many jobs.**
- **Plain flywheel or back geared type.**
- **6½" dia. main bearings, 9" dia. crank pin.**
- **Dimensions of bed and ram face, stroke length and shut height available as required.**
- **Extra heavy box type steel weldment tie rod construction.**
- **Rigid, accurate for precision and long die life.**

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26. ID Welded Carbon Steel Tubing. Six-page folder explains how the tubing is produced so as to help the fabricator cut production time in the manufacture of hydraulic cylinders. The tubing is available in sizes from ½" to 3⅞" in outside diameter and, depending on specific outside diameters, wall thicknesses from .028" to .187". Also included are tables for micro-inch finish and a discussion of the firm's ultrasonic inspection technique. Instructions are given on how to order the tubing. Babcock & Wilcox, Beaver Falls, Pa.

27. Die Makers for Industries. Design skill, pattern and production facilities and experienced personnel at Godin Tool & Die Co. provide good customer service, as detailed in available folder. A Giddings and Lewis No. 350 floor type horizontal boring mill, with a 5" dia. bar, 10' column height, and a 15' horizontal travel, is used for fast accurate metal cutting on large automotive and industrial dies. Other machines and their uses described are the Keller automatics and tryout presses. The back page gives a listing of all the machines for handling die requirements. Godin Tool & Die Co., Hoover and E. 8 Mile Rd., Detroit 5, Mich.

28. Precision Lathe and Components—10 Tools in One. Recent brochure describes the Unimat as ten tools in one, operating on just one base. The lathe with its components can be set up as a drill press, tool and surface grinding machine, milling machine, etc. The specially designed motor operates on either AC/DC 110 volt current. The head stock and motor unit provide 11 different speeds, from 375 rpm to 6000 rpm. The machine is reported to give tolerances of .0004". The basic unit is priced at $99.50. The brochure also pictures and describes attachments and accessories. American Edelstaal, Inc., Unimat Div., 350 Broadway, New York City 13.

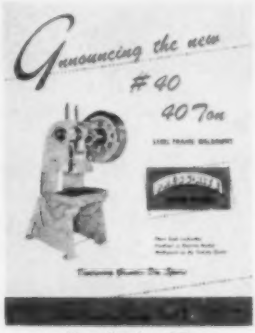
29. Machine Tool Rebuilding. Folder describes services as repairing and reconditioning, rebuilding, rescraping, welding, and machining which is done in the manufacturer's or customer's plant, as required. Illustrations show views of the Burkhard plant machinery. Burkhard Bros., Inc., 203 Wavel St., P.O. Box 187, Eastwood Station, Syracuse 6, N.Y.

30. Soft Blank Top Jaws, for all chucks with American Standard master jaws, are described in brochure. Lengths, heights, widths, as well as chuck size, are given in table form, with pictures and diagrams. Included are soft blank top jaws for power chucks, soft blank top jaws for manually operated chucks, slip jaws for manually operated two jaw chucks, and dove tail slip jaws for dove tail master jaws. The material employed is leaded low carbon steel, laboratory controlled for consistent analysis, and suitable for case hardening, when desired, after machining to accommodate the part to be processed. Rolls Chuck Division, Rolls-Harriman Inc., Route 17 M, P.O. Box 357, Harriman, N.Y.

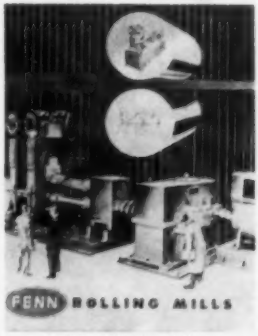
31. Multi-Cycle Hydraulic Tracer Lathe. The various parts, height, width and length of the Model 14 T are very well diagrammed, as well as specifications and



(See Number 34)



(See Number 35)

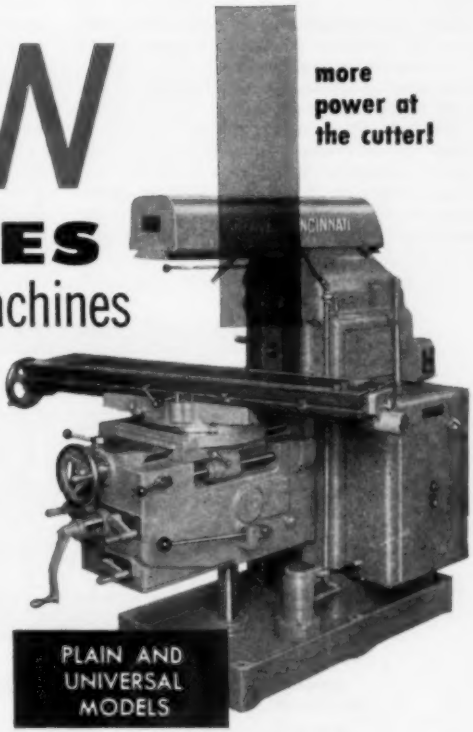


(See Number 36)

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2-XH Milling Machines



PLAIN AND UNIVERSAL MODELS

The completely new GREAVES No. 2-XH Milling Machine brings added versatility, increased operational ease, and more power where it's needed most . . . *at the cutter!*

It utilizes two motors, one for spindle drive; a separate motor for moving table, saddle and knee. Compare this and the other outstanding features of the new Greaves Mill. You'll see why Greaves is "The MOST Mill for the LEAST Money."

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- Wide range of speed/feed combinations for any type material, any type job.
- Heavy, internally ribbed column casting and heavy duty rectangular overarm for maximum rigidity.
- Large, heavy-duty knee, saddle and table provide accuracy for all types of milling.
- New 7½ HP spindle drive motor, with separate motor for movable components, provides extra power for heavy milling.
- Easy-to-reach controls. Handwheels and vertical crank disengage automatically when not in use.
- New rapid traverse lever within operating control area.
- Separate drive motor for table, saddle and knee provides more smooth balanced power at the cutter.

GREAVES
MACHINE TOOL DIVISION

J. A. FAY & EGAN COMPANY
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sizes given to enable the customer to choose the proper one for his need. The machine permits irregular shapes to be turned with unusual speed and accuracy. Only one template, easily attached at the front of the machine and above the work, is needed for multi-cycle tracer turning. There is uniform stock removal for subsequent grinding or finishing operations. Ample chip room is provided by large open cavity. Adequate hp is provided for maximum utilization of carbide or ceramic tools. The Model 14T-25 has 25 hp spindle motor with speeds according to whether two-speed, four-speed or eight-speed head. Spindle speeds for the 14T-40 model are contingent on the heads also. Sundstrand Machine Tool Co., 2531 Eleventh St., Rockford, Ill.

32. General Machine Works, Welding, Fabricating. Brochure describes the 25 years of Klaas' service as covering general machine work, including repairs;

Finest of ALL Local Lighting Units

FOSTORIA LOCALITES

with Amazingly COOL

HEAT VENTILATED REFLECTOR

★ Equipped with marvelous new collar-disc arm joints.

MODEL 55-VCX-701

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A MARVELOUS SEEING TOOL FOR FASTER BETTER WORK

Direct light exactly where needed. Frictional arm and collar disc joints give flexibility of a thousand positions. Rugged construction, heavy duty socket, Levolier switch, universal base.

INNER SHIELD ACCESSORY for extreme coolness when using 100-watt lamp.

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LOCALITE fostoria for Light ON the Job

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welding all types of metals; fabricating monel, stainless steel, aluminum, and other metals, and building special machines. Some of the machines are pictured and described, and a listing is given of the complete equipment. Complete machine shop and welding facilities are indicated. Emco W 5-ton and Emco X 10-ton presses, either bench type or stand-mounted, are built by Klaas. The Klaas Machine & Manufacturing Co., 4314 E. 49th St., Cleveland 25, Ohio.

33. Precision Thread-Roll Dies. Aircraft-quality thread-roll dies, for producing external screw threads in both fine and coarse series, are reviewed in a bulletin issued. Standard thread sizes are from No. 10-32 to 1"-14. The controlled root radius, a feature of these dies, is dimensioned for the various pitch screw threads. A specification table gives overall dimensions of dies and makes selection easy by giving the thread size and type of machine on which they will be used. Standard Pressed Steel Co., Jenkintown, Pa.

NEW DIXON AUTO-TORQUE *Driver*

SCREWS AND NUTS AUTOMATICALLY DRIVEN WITH PRECISE TORQUE CONTROL

Gives you . . .

1 Complete control of screws from parts feeder to chuck, until threads are started. No dependence on gravity to load chuck.

2 Exclusive built-in sensing, assures that screw is driven. Automatically retracts driver only after attaining proper torque.

3 Complete automatic cycle, requires only a touch of the pedal.

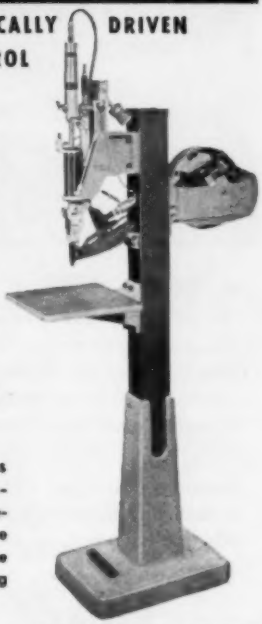
4 Torque accuracy within 5%, comparable to most precise hand-torquing methods.

5 Clutch free-wheels after driving. Operator cannot vary the torque.

6 Two ranges of torque available 0 to 84 inch-pounds and 48 to 120.

7 Work height adjustment with 14" range, can be made without in any way disturbing the machine adjustments.

The new DIXON *Auto-Torque Driver* includes all the features of the DIXON Auto-Positioner, and has an efficient space-saving air motor with an adjustable-torque clutch. These features provide for *positive* handling, giving new efficiency in driving screws and nuts.



Full information available in bulletin No. SD-81.

Model SD-100, above, tooled for any standard screw up to 5/16" thread size. Special tooled units with multiple feeders available. Model SD-101, without floor column, provides a complete automatic station. Maximum width 6 inches.

DIXON AUTOMATIC TOOL, INC.
2306 - 23rd AVENUE
ROCKFORD, ILLINOIS

DIXON

EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

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34. Eccentric Geared Presses. Bulletin 66A presents the Niagara Series SE straight side, single action, eccentric geared presses for large, heavy tonnage drawing, punching and blanking work. Profusely illustrated with detailed drawings and photographs, information is given on the rugged all-steel, four-piece, tie rod frame; box-type welded steel slide; automatic circulating oil system, among other features. Also included are factors governing press speeds, punch speed charts, detailed specifications, elaborated data on press accessories, and a section on presses equipped for automation. Standardized in one-, two- and four-point suspension with 100 through 1250 ton capacities, the presses are available in 130 models. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.

35. O.B.I. Press. Bulletin available describes the 40 ton O.B.I. press which features an all steel frame, heavily reinforced for maximum rigidity, very generous ram area, large bed area, and depth



FISKE'S DIE CASTING COMPOUNDS

These compounds are made in several grades to meet various application requirements such as brushing, swabbing, or spraying. Permit greater production because of more pieces between applications. Improves surface finish . . . prevents sticking and soldering . . . minimizes carbon formation . . . reduces fumes and smoke.

Bulletins describing Fiske's Die Casting Compound and other specialty lubricants and coolants sent on request.



FISKE'S
Since 1870

METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.

129A Lockwood St., Newark 5, N.J.

Plants: Newark 5, N.J. and Toledo 5, Ohio

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of throat to accommodate large die sets. The Press-Rite Airflex Air Friction clutch is available as an optional feature, reported to be completely self-compensating for wear with no excess heating. The press is reported ideal for die cast trimming and electronic work. Standard and optional features are described and complete specifications included. Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn.

36. Rolling Mills are described in available catalog. Included is the Fenn standard line, from 20" to 3" roll diameter mills, a complete section on mills for laboratory and advanced development, wire flattening mills, and related accessories. Special features include formulae for selection of mills for rolling strip and wire, and a comparative specification chart for all Fenn rolling mills. The Fenn Manufacturing Co., Newington, Conn.

FRICTION SAWING with...

Tannewitz
HIGH SPEED BAND SAWS



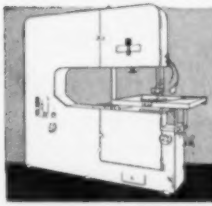
SOLVES THOUSANDS OF PROBLEMS!

FOR EXAMPLE: cutting side panels of a barometric damper as shown above. Cost of dies required for seven sizes would have approximated $12,000 — a prohibitive sum for volume required on these sizes. Friction-sawn on a TANNEWITZ High Speed Band Saw in multiples of two in 1.2 minutes each — a very moderate cost which makes feasible the complete line required. Cost of machine was only a small fraction of cost of dies contemplated and it is also available for many other uses.

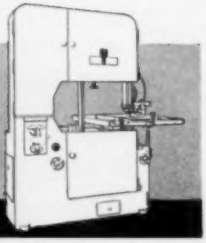
For trimming castings, formed parts, cutting metal as hard as a file and dozens of other operations, too, friction sawing with TANNEWITZ High Speed Band Saws offers tremendous advantages. Write for free booklet, "FRICTION SAWING."



THE TANNEWITZ WORKS • GL 6-1729
GRAND RAPIDS, MICHIGAN



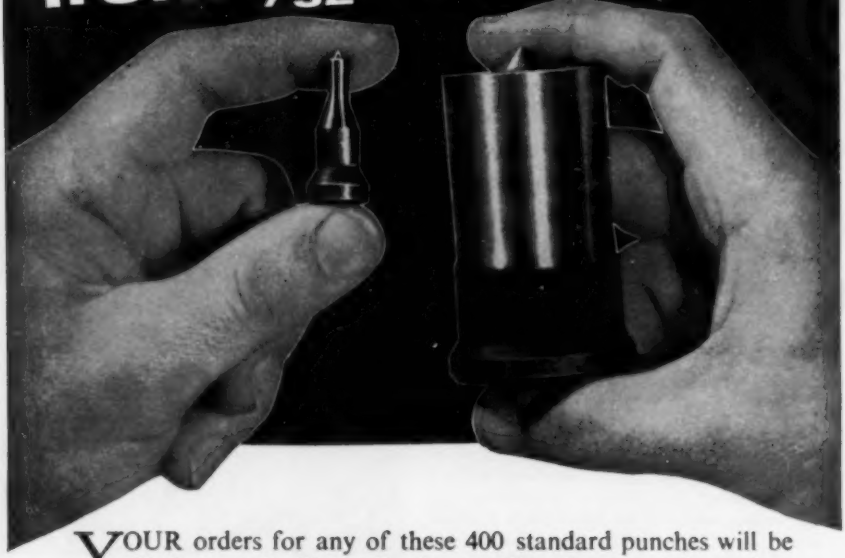
TANNEWITZ DIE-SAWS
24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Die Saws on the market. Write for bulletin.



SAWING MACHINERY SPECIALISTS

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400 Standard Cleveland Punches from 5/32" to 1 1/2"



YOUR orders for any of these 400 standard punches will be filled promptly. Naturally they cost less than special punches. What's more, when you order Cleveland punches you're sure of getting quality tools backed by years of specialized experience. We're constantly experimenting with various steels and processes so that we can give you the very best.

Are your punching machines equipped to use standard Cleveland punches? If not, it will pay you to investigate the many advantages of standardization. For detailed information send for our new Catalog No. 12 today!



AA-0164

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES — FABRICATING TOOLS

City Foundry Division • Small Tool Department

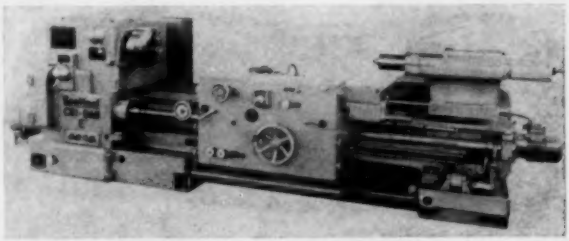
E. 40th & St. Clair Avenue • Cleveland 14, Ohio

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • E. LANSING

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Gisholt Appointed U.S. Distributor Of Cri-Dan Threading Machines

Gisholt Machine Co., Madison, Wis., has been appointed exclusive United States distributor of the Cri-Dan high speed semi-automatic single point threading machines.



The single point carbide threading tool is cam-controlled and is said to provide very accurate lead and thread form on all types of internal and external threads, including multiple-start, coarse, fine, left- or right-hand, parallel or taper, with metric or inch pitches. The machines are reported capable of up to 80 passes per minute at the work.

Lodge & Shipley Appoint Distributor

The J. H. Ryder Machinery Co., Ltd., has been appointed as distributors throughout Canada for the Lodge & Shipley Co.'s entire line of heavy duty



precision lathes. The Ryder firm will handle the English-built Lodge & Shipley C.V.A. Powerturn lathes. They have represented the L&S line of heavy duty squaring shears and power press brakes for many years.

Shown is the Ryder Co.'s new head office and service center at 360 Evans Ave., Toronto.

Baker Bros. Purchases Screwmatic 750 Line

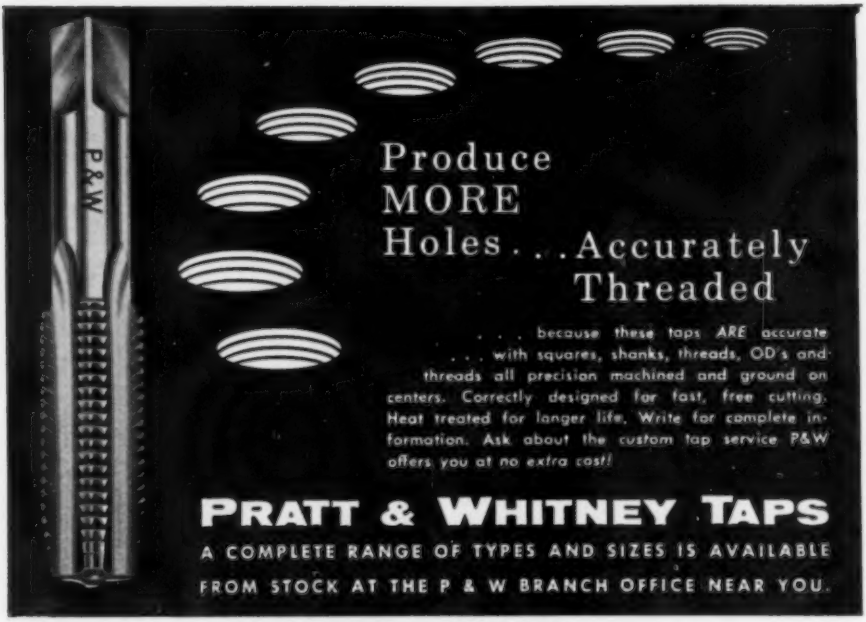
Baker Brothers, Inc., Toledo manufacturer of metalworking machinery, has bought the Detroit Screwmatic 750 line from Gear Grinding Machine Co., Detroit. The name of the machine will be changed to Baker Automatic Bar Machine.

A single-spindle automatic bar machine with three quarter-inch diameter capacity, the Screwmatic 750 has been produced in two models, each capable of performing multiple operations on precision metal parts produced from bar stock.

Among the personnel transferring to Baker Brothers are John Brophy, Robert Rack and Charles Cagnon. Brophy will continue in charge of Sales.

Corporation Purchases Hydraulic Products Co.

The L & L Mfg. Company has announced the forming of a new corporation which had purchased Birming-



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ham Hydraulic Products Co. and changed the name to Birmingham Hydraulic, Inc. The firm will continue to manufacture hydraulic panels, drilled manifolds, side entering subplates, and panel sections (Pan-Sec) at 8088 E. Nine Mile Rd., Van Dyke, Mich.

Officers of the new firm are: G. T. Lyon, Chairman of the Board, Ralph Eckland, President, and T. E. Lyon, Vice-President and Sales Manager.

Guymon Retires

George L. Guymon, for the past seven years vice-president and director of sales for the Industrial Filtration Co., Lebanon, Ind., distributors of Delpark Industrial Filters, has announced his retirement from the filtration business as of August 15.



G. L. Guymon

Die Casters Meet

The American Die Casting Institute, composed of 130 plants, held its annual meeting at the Edgewater Beach Hotel, Chicago, September 10-11. Advancement in production efficiency to improve die casters' services to industry were considered. Research progress was also covered. New standards to be issued will cover die cast threads; fillet, ribs and corners; lettering and engraving.

The ADCI has undertaken an educational program which includes two annual scholarships and a cash prize award program.

The 1958 Annual Doehler Award was won by **Gustav Nyselius,** President, Mt. Vernon Die Casting Corporation, Stamford, Conn., for his many contributions to the advancement of the die casting industry.

Robert C. Strassman, Secretary and

Treasurer, Badger Die Casting Corporation, Milwaukee, has been elected President of the ADCI.

Lundholm Enters Industrial Filtration Field

The Lundholm Manufacturing Co., Rockford, Ill., manufacturers of liquid coolant chillers, are announcing their entry into the industrial filtration field. Patent applications have been filed on a combination filter and drag-out conveyor type of filter.

Correction

In the September 1958 issue of MACHINE and TOOL BLUE BOOK A. D. Diedrich, Jr., Michigan district Bay State Abrasive Products sales representative, was listed as having been employed by "Mid-West Abrasive Co." Bay State informs us this should read "Michigan Abrasive Co." in their release.

Capewell Opens Chicago Office



B. S. Williams

The Capewell Manufacturing Co., Hartford, Conn., announces the opening of new and expanded office and warehouse facilities at 3050 N. Cicero Ave., Chicago 41. The manufacturer's products such as hand hack saws, hammers and ground flat steel saws, power hack saws, hole saws, band will be available.

The operation will be under the supervision of Bruce S. Williams, who assumes the post of district manager in the Chicago-Detroit territory.

Check Class 3 and 3A Thread
...DEPENDABLY, ECONOMICALLY

The P&W Tri-Roll Thread Comparator, using full-length rolls, provides a *complete functional check* . . . detects errors in lead, angle, pitch diameter and in deviation from true helical path ("drunken lead"). With interchangeable single-rib rolls, the same comparator provides a *critical check* of pitch diameter . . . duplicating, for the first time in a production gage, the highly precise 3-wire measurement method. Write for complete information. Pratt & Whitney Company, Incorporated, 22 Charter Oak Blvd., West Hartford, Conn.



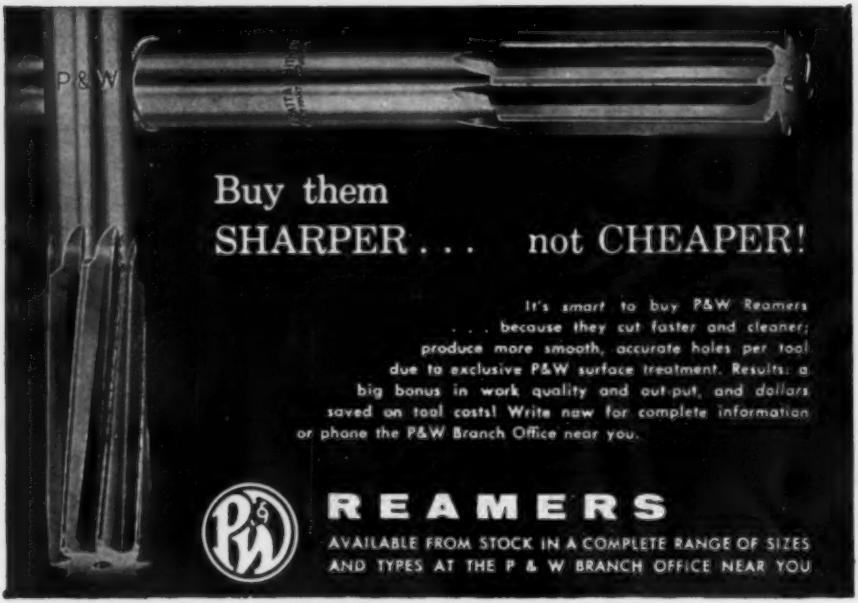
FUNCTIONAL CHECK CRITICAL CHECK OF P. D.

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

Use postpaid card. Circle No. 316



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S-P Mfg. Has Branch in Detroit



The S-P Manufacturing Corp., Solon, Ohio, opened a branch sales and service office at 16801 Wyoming Ave., Detroit 21, to serve customers in the Greater Detroit area.

John J. Scherer has been appointed district sales manager and will manage the Detroit office. He will be assisted by James C. Sprague.

Edward A. Cowles

Edward A. Cowles, founder and president of Cowles Tool Co., Cleveland, for 37 years until his retirement, died August 26 in Cleveland. He was 88 years of age.

Frederick H. Chapin



Frederick H. Chapin, chairman of the board of directors of the National Acme Co., Cleveland, died August 5. He was 83 years of age. Chapin joined the firm in 1926 as president and was elected board chairman in 1933. He resigned the presidency in October, 1957. Chapin was chairman of the board of the Ohio Forge and Machinery Co., and served on the boards of the Cleveland Trust Co., White Motor Co., Oliver Corp., Eaton Manufacturing Co. and the Land Title Guarantee and Trust Co.

Melvin H. Emrick



Melvin H. Emrick, president and board chairman of Ettco Tool and Machine Co., Inc., Brooklyn, N.Y., died of a heart attack June 30. He was 47 years of age. Emrick was associated with the company, founded by his father, throughout his entire business career. He was elected vice-president in 1940, president in 1947, and chairman of the board in 1951.

Appointments and Promotions

New Dealers and Distributors

American Coldset Corp.	Teterboro, N.J.	Ferm-All Mfg. Co. Long Valley, N.J.
Midwest Die Supply Co.	Toledo, Ohio	H. E. Dickerman Mfg. Co. Springfield, Mass.
Cleveland Duplex Co.	Lakewood, Ohio	H. E. Dickerman Mfg. Co. Springfield, Mass.
Production Engin. Sales Co.	Dayton, Ohio	H. E. Dickerman Mfg. Co. Springfield, Mass.

FASTER, EASIER HANDLING FOR IRREGULAR WORK SHAPES

THE PRATT & WHITNEY VERTICAL SHAPER is the handiest machine in any shop. Powerful, accurate and versatile, it is much more than a slotter . . . handles a wide variety of irregular shapes with speed, precision and economy. Vertical design eliminates springing, insures permanent accuracy. Cutting action helps to hold work in place. Supplied in 2 sizes with 6" and 12" ram strokes.



Write now for Circular No. 423-9.
PRATT & WHITNEY Co., Inc.,
22 Charter Oak Blvd.,
West Hartford, Conn.

PRATT & WHITNEY
FIRST CHOICE FOR ACCURACY
MACHINE TOOLS • GAGES • CUTTING TOOLS

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Changes in Executive and Production Personnel

Name	Company	To	Position
James L. Wheeler		Clearing Machine Corp. Chicago, Ill.	General Manager
Harold B. Swindells	Laminated Shim Co., Inc. Glenbrook, Conn.	Same	Treasurer
Thomas F. Collins	Metal Forming Corp., Div. Vanadium Alloys Elkhart, Ind.	Vanadium-Alloys Steel Co. Latrobe, Pa.	Director
Albert H. Dall	The Cincinnati Milling Machine Co., Cincinnati, O.	Same	Chief Engineer, Mach. Tool Div.
Kenneth W. Meytrott	Etteo Tool & Mach. Co., Inc. Brooklyn, N.Y.	Same	Chairman of the Board
Edward G. Maylinder	Etteo Tool & Mach. Co., Inc. Brooklyn, N.Y.	Same	President



J. L. Wheeler



H. B. Swindells



T. F. Collins



A. H. Dall

Fast, Easy Cutting!

THE MILFORD® FLEXIBLE BACK HOOK TOOTH BLADE

Teeth with Positive Rake Angle bite cleanly into the work permitting unusually fast, free cutting of non-ferrous metals, plastic, wood and large easily-machined ferrous sections. Available in standard widths from ¼" to 1", from 2 to 6 teeth per inch.



POSITIVE RAKE ANGLE

BUY FROM YOUR MILFORD DISTRIBUTOR . . . You'll save TIME, CUT BUYING COSTS and REDUCE INVENTORIES.

MILFORD

THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 80 Years
NEW HAVEN 5, CONNECTICUT

HACK SAW AND BAND SAW BLADES • HOLE SAWS • GROUND FLAT STOCK

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E. N. Smith



K. J. Wilson



M. W. Hanner



Burton J. Nadeau

Changes in Executive and Production Personnel

Name	Company	To	Position
E. N. Smith	Kennametal Inc. Latrobe, Pa.	Same	Tech. Dir., Chem. & Metal. Lab.
George O. Gale	Production & Engrg., Desoto, Detroit, Mich.	Same	Mgr.—Engrg.
J. R. Coughlin	Production & Engrg., Desoto, Detroit, Mich.	Same	Mgr.—Product Planning
W. A. Reinert	Production & Engrg., Desoto, Detroit, Mich.	Same	Mgr.—Volume Planning
A. L. Bickel	Production & Engrg., Desoto, Detroit, Mich.	Same	Dir.—Cost Estimate

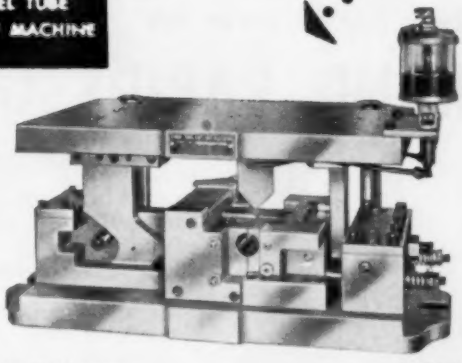
Cuts Tubing to Accurate Lengths in
SPLIT SECOND TIME!

VOGEL TUBE CUT-OFF MACHINE

LENGTHS of ½ inch or more are accurately cut to ± .010" with each stroke of press—actually less than ½ of a second or faster than any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

Unit No. 12 accommodates tubing up to ½" O.D. with 3/32" wall; the No. 2 takes tubing up to 2" O.D. with ⅛" wall.

Ask for sample showing how clean-cut your tubing can be sheared with this machine.



PATENTED

VOGEL TOOL AND DIE CORPORATION
1825 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

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Changes in Sales and Service Personnel

Name	Company	To	Position
M. W. Hanner	Capewell Mfg. Co. Hartford, Conn.	Southeastern Territory	District Manager
Kenneth J. Wilson	Capewell Mfg. Co. Hartford, Conn.	Richmond, Va.	Sales Engineer
Burton J. Naden	Vascoley-Ramet Corp. Waukegan, Ill.	Same	General Sales Manager
Joseph J. Ranna	A. M. Lockett & Co., Ltd. New Orleans, La.	Same	Manager
G. Michael Baccich Jr.	A. M. Lockett & Co., Ltd. Baton Rouge, La.	New Orleans	Assistant Manager
Marlin Kirk	Potter & Brumfield, Inc. Princeton, Ind.	Potter & Brumfield Canada Ltd. Guelph, Ontario	Sales Manager



Joseph J. Ranna



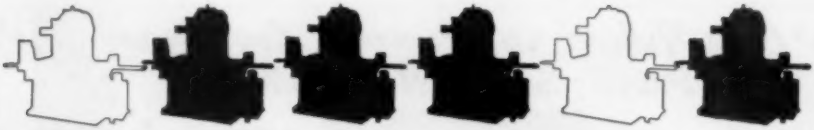
G. Michael Baccich Jr.



Marlin Kirk

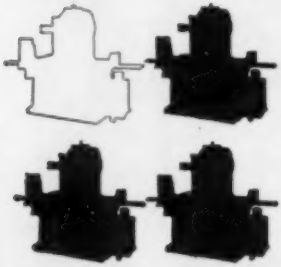


R. E. Reid



SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS...



— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book that tells you why.



GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON CO.

405 Straight Ave., S.W. Grand Rapids, Michigan

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W B. Panko



G. H. Weight



J. H. Roach



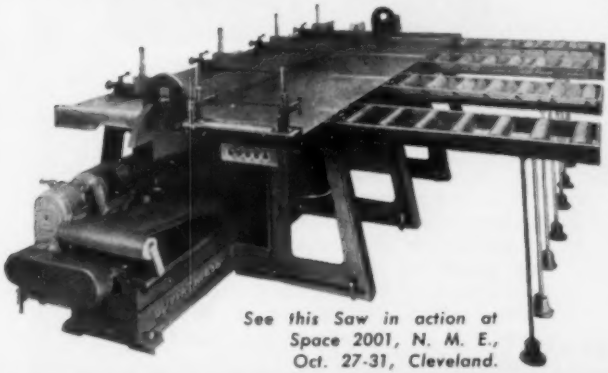
W. P. Sheffield

Changes in Sales and Service Personnel

Name	Company	To	Position
Robert E. Reid	Hyprez Div., Engis Equipt. Co. Chicago, Ill.	Same	General Manager
Walter B. Panko	Hyprez Div., Engis Equipt. Co. Chicago, Ill.	Same	Sales Manager
G. H. Weight	Babcock & Wilcox Co., Tubular Products Div. Houston, Tex.	Chicago, Ill.	Sales Manager
J. H. Roach	Babcock & Wilcox Co., Tubular Products Div. Houston, Tex.	Tulsa, Okla.	Sales Manager
W. C. Mohrman	Babcock & Wilcox Co., Tubular Prod. Div. Tulsa, Okla.	Houston, Tex.	Sales Manager

Cut large nonferrous sheets and plates smooth and fast on the OLIVER PLATE SAW

This Saw slashes costs in aircraft and metalworking plants. Cuts aluminum up to 6" thick. Also copper, bronze, micarta and similar materials. Saw unit travels 1' to 40' a minute. Cast iron tables each side of saw: 2½'x12'. Each table extension 18"x49" has 7 rollers. Write for Bulletin 838.



See this Saw in action at Space 2001, N. M. E., Oct. 27-31, Cleveland.



OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN

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Changes in Sales and Service Personnel

Name	Company	To	Position
Walter P. Lotz	Landis Tool Co. Waynesboro, Pa.	Same	Vice-Pres.—Sales
William P. Sheffield	Cutting Tool Div., Brown & Sharpe Mfg. Co. Providence, R.I.	Same	Asst. Gen. Mgr.
Frank E. Mentie	Cutting Tool Div., Brown & Sharpe Mfg. Co. Providence, R.I.	Same	Supt., High Speed Steel
T. Russell Hall	Cutting Tool Div., Brown & Sharpe Mfg. Co. Providence, R.I.	Same	Asst. Supt., High Speed Steel
Patrick G. Lindemann	Cutting Tool Div., Brown & Sharpe Mfg. Co. Providence, R.I.	Same	Dept. Foreman, Machining Sections
Dimitri Yasinczuk	Cutting Tool Div., Brown & Sharpe Mfg. Co. Providence, R.I.	Same	Supervisor, Quotation Section



SUPREME

Use this unique steel for the very ultimate in cutting prowess. Highest hardness, highest wear resistance make **Vasco Supreme** the aristocrat of the shop when you want the most! Where production economics call for different bits, use **Neatro, Red Cut Superior, Red Cut Cobalt**—each a profit-maker in its range. *Write for Data Sheets.*

VANADIUM-ALLOYS STEEL COMPANY
LATROBE, PENNSYLVANIA

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HANDSTONING sharpens toughest cutting edges—faster, cleaner

For more production and longer life from cutting tools, wearing gears and precision parts — master mechanics always use *oilstone* files.

For deburring, chamfering, radiusing and fitting precision parts — tool and die makers rely on *oilstone* files for fine finishing.



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ANOTHER NEW

di-acro PRODUCT

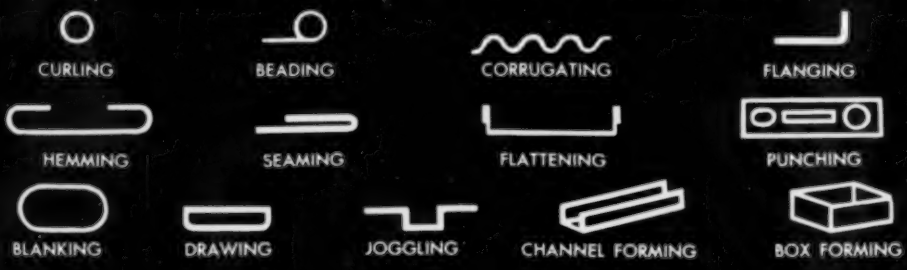


Di-Acro Hydra-Power Press Brake Model 16-72. Ram adjusted, forms up to 6 ft. wide 16 gauge steel —62" between housings.



New

these duplicating operations and many others are performed on **DI-ACRO HYDRA-POWER PRESS BRAKES**



The Piper Aircraft Corporation of Lock Haven, Pennsylvania, has increased small part forming 50 per cent with two Model 16-36 press brakes. Heavy production machines are free from costly short runs.

The Edson Tool & Mfg. Co. of Belleville, New Jersey, has this Model 16-36 Press Brake. Management acclaims the low cost, low maintenance, and short set-up time . . . now has eight Di-Acro Brakes in operation.

• Hydraulically Operated Press Brake

with dual speed operating cycle and adjustable stroke

★ Increases press brake output ★ Minimizes operator fatigue

★ Eliminates hazards of high speed production

O'Neil-Irwin Mfg. Co.

314 8th Ave., Lake City, Minnesota

BUSINESS REPLY CARD

First Class Permit No. 13, Lake City, Minn.

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

ANOTHER NEW

di-acro

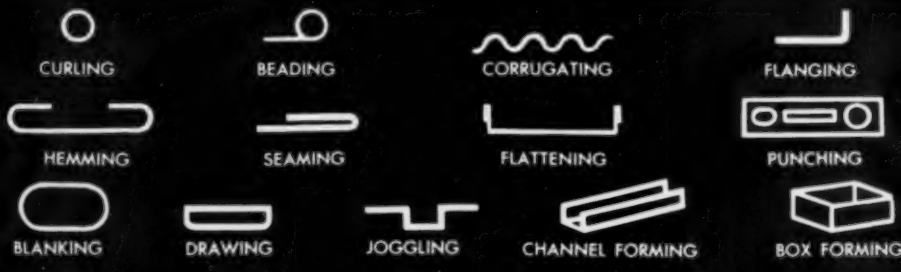
PRODUCT



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★ Increases press brake output ★ Minimizes operator fatigue
★ Eliminates hazards of high speed production

In less than 15 seconds the operator can pre-set the length of stroke on the new Model 16-72 Press Brake to the narrowest and safest opening for each job. The Dual Speed Operating Cycle provides a ***high speed*** ram approach and return on each operating cycle plus an automatic increase in power during the ***slow speed*** work part of each stroke when the material is formed. Material does not whip and the operator is not required to slip a clutch.

The twenty-five tons of ram pressure on the Model 16-72 Brake can also be inched delicately to a hair-wide scribed line with this new press brake where it can be stopped and started to carry through the operating cycle ***with full pressure***. The ram is also instantly reversible at any point in the stroke.

This new design in press brakes has two rotary vane-type hydraulic cylinders that are mechanically linked to the ram to provide equalized pressure at all times. These cylinders oscillate through an arc of 270 degrees or less depending upon the length of the pre-set stroke. There are no brake bands or clutch discs to wear out or adjust.

Safety features and foolproof automatic operation make these the ideal production machines for women and inexperienced operators. Included as standard equipment with the Model 16-72 Brake are such additional features as Power Ram Adjustment and Micrometer Front Operated Back Gauges. There are honestly so many advantages to this brake that it takes an eight-page folder to tell the whole story. Why not use the postage-free coupon below to request your copy today.

See Di-Acro Machines in operation at Booth No. 260, National Metal Exposition, October 27-31, Cleveland

MORE IMPRESSIONS PER DOLLAR WITH "GTS" TOOLS



GTS produces Marking Tools of uniform quality.

Your most rigid requirements will be met with every tool which bears the GTS trademark—whether your need is for one tool or for thousands.

The quality built into GTS tools results in longer life, more legible impressions —real economy.

From raw stock to final inspection, these tools are produced in our own plant by skilled craftsmen using the most modern facilities.

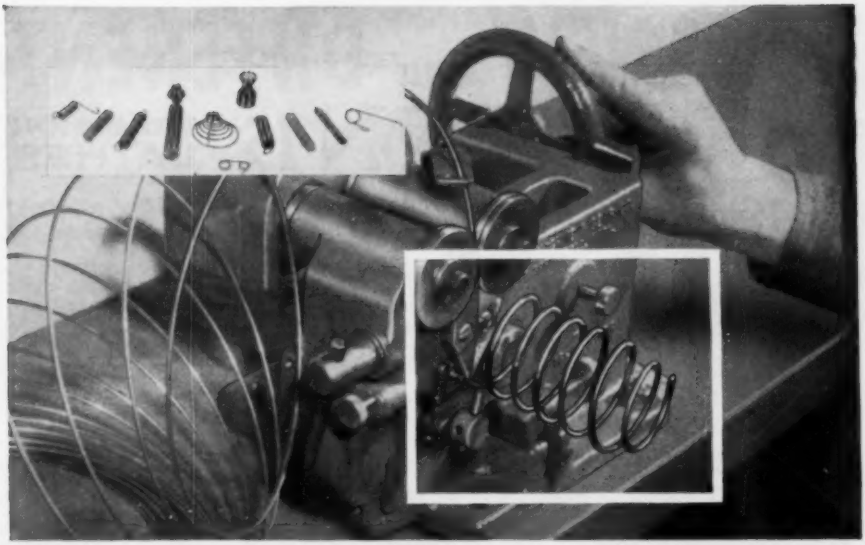
Hundreds of standard items can be shipped from stock. A complete inventory of alloy steels permits quick delivery on tools made to order.

Use GTS tools and *you'll know* that there is real economy in buying the best .

IF IT'S WORTH MAKING IT'S WORTH MARKING

GEO. T. SCHMIDT, INC.
1802 W. BELLE PLAINE AVE.
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Make any type spring . . . fast, exact!

WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005″ to .125″, you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32″ to 12″ and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!

PERKINS
MACHINE AND GEAR CO.
Special Machinery Division,
West Springfield, Mass.



Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

Perkins Machine and Gear Co.
Special Machinery Division, Dept. A1
W. Springfield, Mass.
Please send information and prices on Perkins Spring Coiler.
Hand Model ☐ Power Model ☐

Name.....Title.....

Company.....

Address.....

City.....State.....

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Both NEW *and* DIFFERENT
SHELDON 15″ PRECISION LATHES



ER6OP
5′ bed—31″ centers

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1½″ Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

$2350.00 base price F.O.B. Factory (Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5′, 6′ and 8′ bed lengths providing 31″, 42″ and 66″ center distances.

Write for Circular

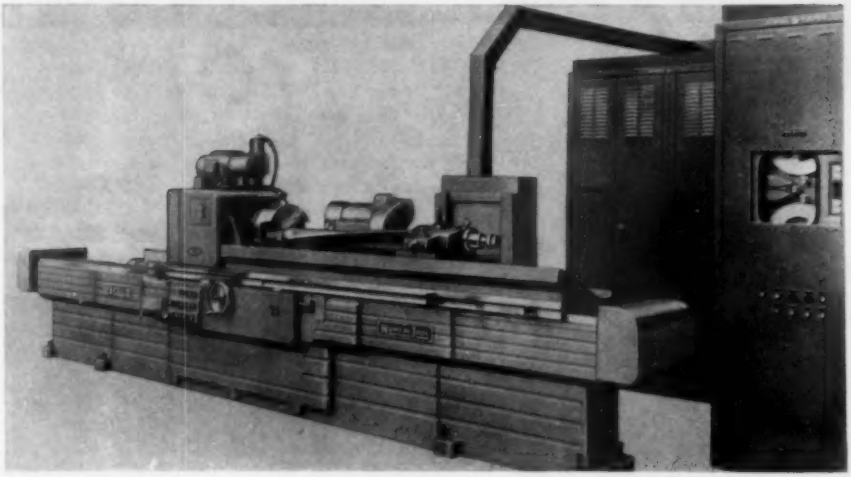
SHELDON MACHINE CO., INC. 4242 Knox Avenue • Chicago, U.S.A.

Now on display and being demonstrated by SHELDON Dealers everywhere, including:

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Aurora (Ill.)	Valley Supply Tool Co., Inc.	Elkhart (Ind.)	Niblock Machinery, Inc.
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Bridgeport	J. L. Lucas and Sons, Inc.	Los Angeles	Harron Rickard & McCone Co. of So. Calif.
Buffalo	Beals, McCarthy & Rogers, Inc.		Seaboard Machinery Company
	O'Connell Machinery Company	Milwaukee	State Machine Tool Company
Chicago	Boyd Wagner Company	Minneapolis	Satterlee Company
	Crown Supply Company	Newark	Ralph Hochman Company
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Cincinnati	Cincinnati Machinery Company	New York City	Morris Abrams, Inc.
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Profiling Machines Apply Numerical Control With Work Rotation



Numeri-Trol profiling machines perform numerically controlled three-dimensional machining around the axis of the work. Equipped for milling and grinding operations, they are also the first numerically controlled machines in which grinding, dressing and dressing compensation are incorporated, according to the firm. All the instructions for the machining operations are recorded on tape. The length of time required to make the tape is dependent upon the complexity of the part. Parts of irregular and twisted forms can be machined.

Ex-Cell-O does not manufacture the control equipment, but designs and builds machines that can be operated from any high performance numerical control system. Of the first two profiling machines, one is operated by a magnetic tape system and electric servo motors, while the other uses punched tape and hydraulic servo motors.

Also, of the first two machines, the purpose of one is the production of steam turbine buckets in relatively small lots. It will handle a range of buckets up to 60" long and 11" wide. The other machine is intended for producing cams, templates and prototype jet engine blades.

Some of the advantages of these machines with numerical control are said to be shorter lead time, as prototype parts can be produced in a fraction of the time formerly required; quick change-over; elimination of costly handling and storage of tooling, and no lost time between various phases of work, as the rate of production is controlled by the tape.

New "Series 333" Drills for Drilling Cast Iron!



ACE

CARBIDE DRILLS

Whatever your carbide drill requirements may be . . . whether solid carbide or carbide tipped . . . it always pays to make sure you use an "ACE". Their "ground-from-the-solid", highly polished flutes have keener, stronger cutting edges. And that means finer accuracy, longer tool life, and lower drilling costs for you!

Call your local Ace Drill Distributor today!

ACE DRILL
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

Use postpaid card Circle No. 326

Both work table and cross slide of the machine are actuated by preloaded anti-friction lead screw and nut assemblies that are ground on Ex-Cell-O thread grinders, to provide accurately controlled table movements.

The cross slide supports interchangeable milling and grinding assemblies. The milling unit consists of a spindle, a gear reduction motor and a silent chain drive, all mounted on a base. Carbide tipped form relieved milling cutters are used, the cutter diameter being selected for the work to be done.

The grinding assembly features an Ex-Cell-O precision grinding spindle with its drive equipment and a hydraulically operated swivel type diamond dresser, all assembled on a base. It has an elongated cup-type grinding wheel.

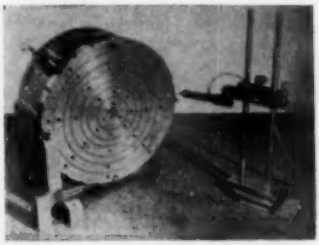
The pause in the machining cycle, the withdrawal of the cross slide for the dressing operation and the frequency of dressing are controlled by the tape.

During grinding and in rotary milling operations one motor drives the work spindle, and through a train of gears, also drives the lead screw to give the desired feed per revolution.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Use postpaid card. Circle No. 81

Power Drilling And Checking Fixture



Fixture can be motor driven or hand operated.

The M-M Check can be used as a

grinding fixture for grinding any combination of slots, squares, hexagon, etc. It is also an accessory for a jig grinder, a jig borer, for boring or drilling holes in plates on bolt circles 1, 2, 3, 4, 6, 8, 12, 24 combinations. The fixture is designed for checking any angles.

The Model S-24 is made for applications requiring less accuracy, with a tolerance of .002. Model P-500 is designed to hold close tolerances, with a .0003 accuracy.

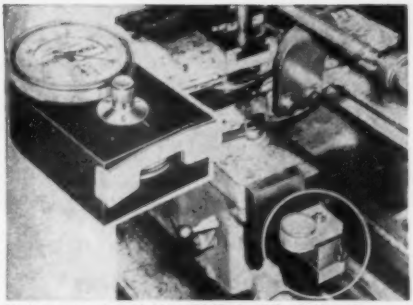
The unit can be motor driven or can be purchased without the motor and hand operated.

M-M Tool Mfg. Co., Dayton 2, Ohio.

Use postpaid card. Circle No. 82

Measuring Indicator Features Infinite Travel

The Trav-A-Dial, for use with any machine tool, measures complete longitudinal travel of the machine, as well as transverse and vertical travel on certain tools. The instrument reads any



It is accurate within .001" in 6" of travel.

length in 6" increments, furnishing a visual record in inches, hundredths and thousandths on its large, easy-to-read dial. The indicator is reported as accurate within .001" in 6" of travel and repeats unfailingly. No plungers are used, no measuring rods or other devices are required.

On lathes, the instrument enables operators to pick up lineal measurements without using stops or resorting

Adjustable
MULTI-DRILL
for Production Drilling

9" DRILLING AREA
AVAILABLE WITH 2 TO 8 SPINDLES

- Designed for accurate, high speed production drilling
- RUGGED CONSTRUCTION
- Quick, easy adjustments to **any** hole pattern on or within a 9" circle; ½" minimum center distances; Drill sizes ½" to ⅜"
- Special adaptations available.

MULTI-DRILLS are made in other sizes and models.

Write for details and name of your nearest Distributor.

Locater arms are designed for fast, easy adjustment

Dependable Performance... proven by industry



Model 900

FITS ANY DRILL PRESS

COMMANDER MFG. CO.
4227 W. KINZIE STREET, CHICAGO 24, ILLINOIS

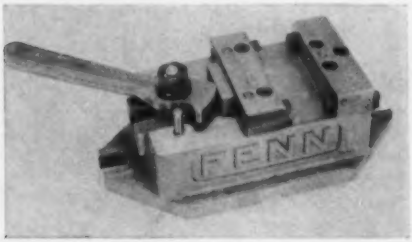
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to other measuring means. It is used for boring blind holes, turning shoulders or grooves to exact tolerance and spacing, and in making set-ups. Errors on mills, which result from worn lead screws, backlash, or changes in table position, are said to be eliminated.

M. E. Hodge Corp., 35 N. Raymond Ave., Pasadena 1, Calif.

Use postpaid card. Circle No. 83

Vise Has Quick-Action Cam Lever



In 3 sizes; openings of 3-1/4", 4-3/16", and 6-7/16".

An improved model of their quick-action vise, made of hardened, ground steel, has been developed by the Fenn Manufacturing Co. as a precision work-holding device for milling, drilling and assembly. The vise operates with a quick-action cam lever that opens or closes jaws instantly and uniformly. An eccentric handle then locks for a doubly secure grip.

The vise is obtainable in three sizes with openings of 3¼", 4-3/16", and 6-7/16".

The Fenn Manufacturing Co., Fenn Rd., Newington, Conn.

Use postpaid card. Circle No. 84

Nut Unit Clinches Nut in One Stroke

The Pierce Nut Unit is mounted in a press to drive a special Fabristeel nut into sheet metal for permanent, high speed fastening requirements, with a single stroke of the press.

Wales-Strippit, Inc., 204 South Buell Rd., Akron, N.Y.

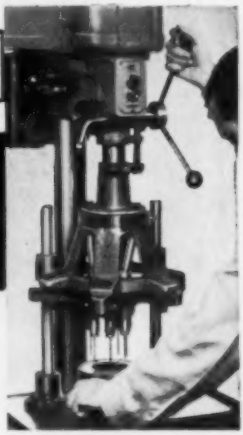
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ETTCO-EMRICK

Knuckle-heads

fully adjustable for dependable multi-hole drilling and tapping

5 models to choose from — circle or straight line types



- Chrome nickel universal ball joint type spindles.
- Adapt to any drill press or drilling or tapping unit or machine — Operate in any position.
- Quickly convertible for either drilling or tapping on any drill press.
- Lubricated ball joints with neoprene covers — an Ettco exclusive.
- Tap or drill capacities up to ⅝" in steel.
- Precision built, lightweight and compact.

Unconditionally guaranteed for workmanship, material and performance.

Write for complete details today . . . Buy them from your Ettco Distributor

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NEW

JONES & LAMSON EXTENDED RANGE OPTICAL COMPARATOR

and Universal Measuring Machine

Again, Jones & Lamson fills a long-standing need by introducing a new Comparator, the FC-30-ER, with 30" dia. screen. It is designed especially to give *added measuring capacity* (up to 10" horizontally, 8" vertically), and *added work capacity* (200 lbs. and more, on a rugged 8" x 32" table, supported on precision rolls and twin heavy duty columns).

This new Extended Range J & L Comparator is *the largest standard 30" Comparator made.* It includes J & L's True Telecentric Optical System, Adjustable High Intensity Illumination and Precision Matched Lenses.



The FC-30-ER, equipped with J&L's NEW Lead Amplifier, affords precise inspection of thread lead to .0001". The Amplifier produces up to a 500:1 amplification of any lead error in threads ranging from 4 to 70 pitch.



MODEL FC-30-ER

"World's oldest and largest builder of precision optical comparators"

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 520 Clinton Street, Springfield, Vt., U. S. A.

Please send me Comparator Catalog GL5803, which describes the complete line of J&L Optical Comparators.

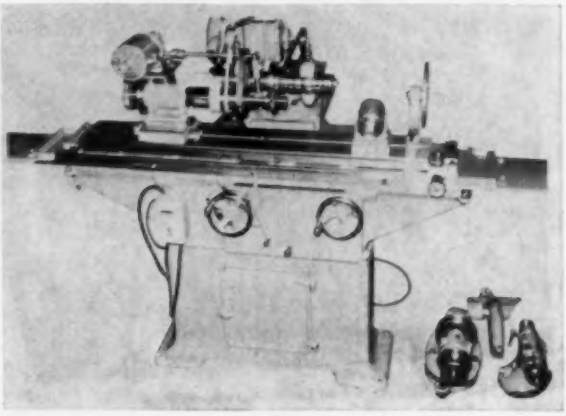
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company _____ city _____ zone _____ state _____

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Machine to Grind Carbide Throwaway Tools

A machine has been designed to grind carbide throwaway tools in various applications. It is said to grind the entire periphery of the throwaway, including the radius in one operation. The radius is ground perfect tangent with the sides. The sides are flat and parallel within .0002.



The machine will grind any shape tool, including squares, triangles, pentagons, diamond shapes and rounds, according to the firm, and radiuses from .010 up. It will grind negative and positive rake tools, and is reported to hold a .0005 tolerance on production.

The Harvill Machine Co., 618 East 10-Mile Rd., Hazel Park, Mich.

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FOR ACCURACIES TO .000020" (TWENTY MILLIONTHS) . . . specify . . . VEE-ARC SUPER-PRECISION LIVE CENTERS



Designed for ULTRA-PRECISION TURNING and GRINDING OPERATIONS!

SUPERIOR FEATURES:

- Extended spindle—carbide tipped!
- Life-time lubricated, pre-loaded ABEC-7 ball bearings!
- Spring compensation to .020" axial growth without impairing accuracy!

For your convenience, Vee-Arc Live Centers are also available through your Monarch Lathe distributor.

Mail Coupon Now!

VEE-ARC CORPORATION, Department BB-9, Westboro, Mass., U. S. A.

Please send Bulletin 1282 on Vee-Arc Live Centers to:

Name Firm

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A Dream for the DRILL PRESS OPERATOR

Archie operated one of the two drill presses in the maintenance department. He spent about 6 hours a day running back and forth collecting V-blocks, parallels and clamps—and making set-ups for various shapes and sizes of work. That left only 2 hours to drill.

Now he drops in the work, tightens the vise and starts to drill. The other drill isn't needed any more. One drill press, equipped with the Modern Safety Drill Table, easily handles the work of two.

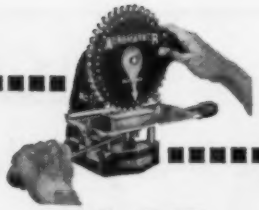
We will put one of these drill tables in your shop and guarantee it will save its cost in labor alone within 6 months. You can't go wrong on a deal like that!

Write for our FREE TRIAL OFFER



MODERN MACHINE TOOL CO.
2005 LOSEY AVENUE
Jackson, Michigan

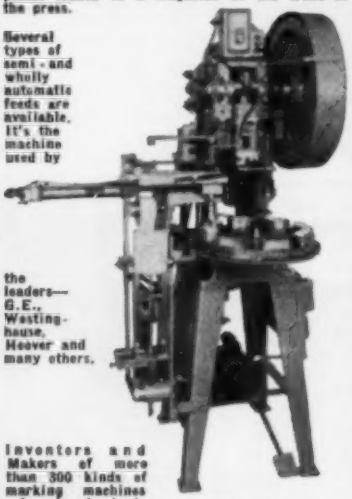
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FAST
NAME-PLATE STAMPING

ACROMARKER patented machines are used by the thousands because they're so adaptable to any straight line or true curved line marking job. Several sizes are stocked from 1/16" to ¾" characters. Styles range from bench and floor stand models to the high production power unit illustrated below that automatically feeds, stamps, serializes, ejects and collates name plates loaded in a magazine at the front of the press.

Several types of semi- and wholly automatic feeds are available. It's the machine used by



the leaders—G.E., Westinghouse, Hoover and many others.

Inventors and Makers of more than 300 kinds of marking machines—largely standardized. Specify ACROMARK to get the right machine for the job.

Write today for Catalog 1-2A. Send your name plate for sample marking. Indicate production need for engineer's recommendation.

The ACROMARK Company

15 Morrell St. Elizabeth 4, N.J.

"The Original Marking Specialists"

Use postpaid card. Circle No. 332

Improved Swiss Micrometers and Callipers

The Polyplan micrometers and Vernier callipers, recently perfected in Geneva by one of Switzerland's renowned inventors, have undergone rigid testing in Europe.

The micrometers, with a reading of 1/10,000 of an inch, measure from 0-1", 0-2" and 0-3". All have six interchangeable anvils for all-purpose application.



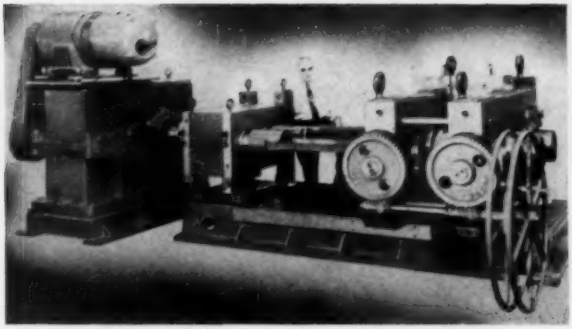


All the anvils can be rotated a full 360° on a plane parallel to the measuring surfaces, thus making it possible to measure distances between points on different axes.

The callipers have a hinged lower jaw, which in the 10" instrument swings a full 180° and in the 7" one 360°. As in the case of the micrometers, this is reported to make the measurement between points on two separate axes as simple as between those on a single axis with ordinary callipers.

Polyplan Co., 45 W. 81st St., New York 24, N.Y.

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Rolling mill for compacting powdered metals.

Rolling Mill Offers Horizontal or Vertical Rolling

The Model V4-126 quickly converts for either horizontal or vertical rolling by simple movement of pinion stand and roll housing. It can be used vertically for rolling powdered metals or as a horizontal mill for rolling strip. The mill shown is a two-high/four-high combination unit with 12" rolls, 40 hp variable speed AC drive.

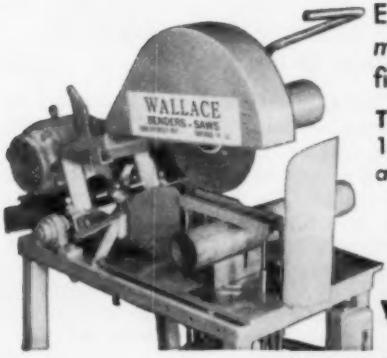
All sizes can now be supplied with the convertible feature.

The Fenn Manufacturing Co., Fenn Rd., Newington, Conn.

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DO YOU CUT THESE THINGS?



Ever stop to think that *one poor cut makes two poor ends* which may need filing, grinding or re-machining?

The WALLACE Modular . . . in 3 sizes — 16", 18", 20" . . . cut to 6" O.D.; gives *clean, accurate, machined-like ends.*

WRITE for free 44-page book. Learn how it's done. Write now.

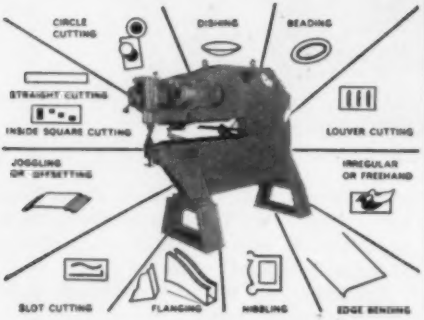
WALLACE SUPPLIES MFG. CO.
1300 West Wolfram St. • Chicago 13, Ill.

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A COMPLETE SHEET METAL SHOP IN ONE MACHINE

PULLMAX

DOES ALL OF THESE OPERATIONS



★ CUTS MILD STEEL UP TO 11/32"

The one machine that's sure to save time, labor and material when you work sheet or plate. Eliminates expensive die costs—easy to operate. 7 sizes to choose from.

Write for free catalog on Metalworking Ideas.

. . . 16 mm. sound film . . . or a demonstration right in your plant.

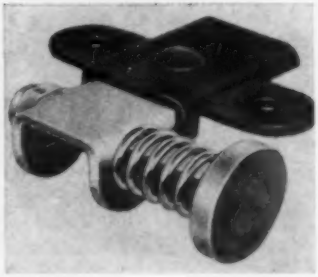


AMERICAN PULLMAX CO., INC.

2473 N. Sheffield Ave., Chicago 14, Ill.

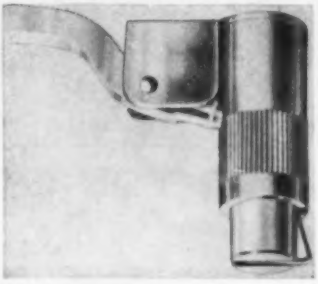
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Cut Off and Automatic Die Stops



Cut off die stop.

A ready-to-go accurate stock stop that installs in minutes on any die, adjustable two ways for any parting die operation, is the cut off die stop. It is adaptable for any cut-off operation as parting dies, and cut-off saws. The unit is sturdy steel throughout and rustproof plated. It can be re-used over and over again. The strong spring absorbs cutting shock.



Automatic die stop.

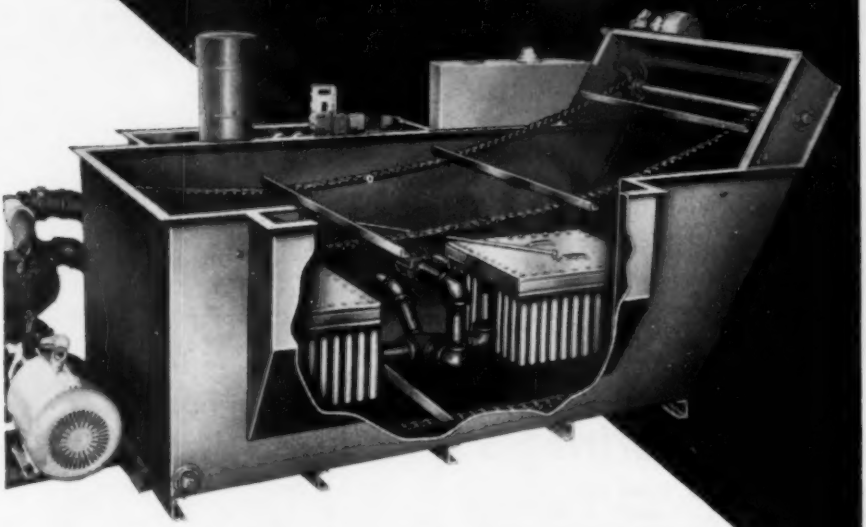
The automatic die stop is installed by simply drilling, reaming, and pressing into position. It stops material just prior to the piercing, shearing or blanking operation. The die stop is actuated by an adjusting screw located in the top die shoe.

Keystone Engineering and Manufacturing Co., 122 S.W. 16th St., Des Moines, Ia.

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for versatility in filtration

CFC Delpark FILTER-MATIC



CFC Delpark Filter-Matic gives constant vacuum filtration for all types of fluids such as coolants, cutting oils, rolling oils, and solvents.

To meet *individual* fluid characteristics and flow rate, you have a choice of Leaf-Type or Tubular Screen elements plus a variety of metal screen or natural fibre media.

Dual manifold design allows uninterrupted filtration — one manifold on filtering cycle while the other is on backwash or cleaning.

Pre-coat filter aids may be used to give absolute filtration.

Write for technical literature to Department **MT.**

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

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your solution to:

blind hole tapping



. . . tap cartridges

provide clean, chip-free, tapped blind holes.
CARTRIDGE TAPPING . . . consists of tapping into TAP-CARTRIDGE which has been introduced into the drilled hole. It obtains smoother, more nearly perfect formed, and uniform threads to the very bottom of a hole in any material. The newer materials, such as magnesium and plastics are easily tapped in one rapid and uniformly successful operation.
. . . saves time, labor and money. Tap life is increased three, five, even ten times with definite reduction in scrap, and improvement in production and product.
. . . replaces COOLANTS and LUBRICANTS with clean, dry TAP-CARTRIDGES.
A quantity sufficient for trial on your most difficult operations will be furnished without cost or obligation.

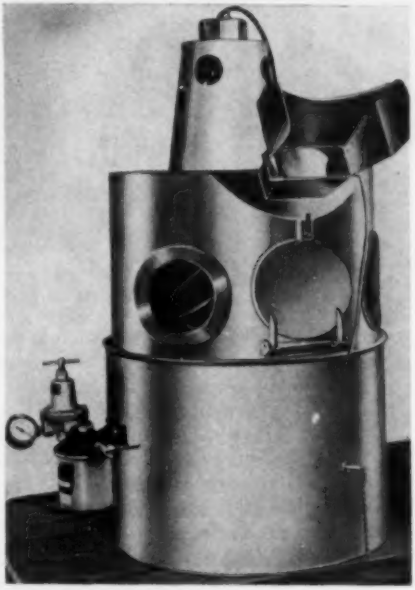
THE TAP-CARTRIDGE CO.
2020 THOMAS ST.
HOLLYWOOD, FLA.

Use postpaid card. Circle No. 336

Wet Blast Honer

A wet blast honer, called the Liqui-Breez, has been added to the Tamco line of precision-built automotive and industrial equipment. It is designed to save re-sharpening time, cut machine down time and produce high quality finish de-burring. For honing all types of tungsten-carbide and H.S.S. cutting tools and drills, the operation of the machine requires an abrasive load of 5 lb. plus 3 lb. of water. The unit has a specially designed viewing scope and shield to permit direct view of the work.

The wet blast honer is said to fix a true edge that gives longer tool life with greater operating efficiency.



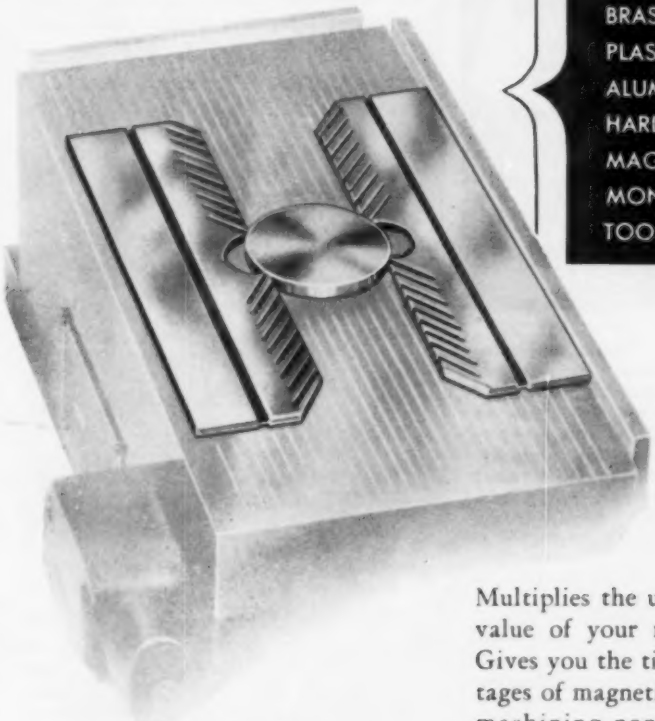
A viewing scope permits viewing of the work.

Tobin-Arp Manufacturing Co., 6400 Penn Ave. So., Minneapolis 23, Minn.

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Magna-Vise HOLDS 'EM ON YOUR MAGNETIC CHUCK

Non-magnetic materials like
BRASS, COPPER, PLASTIC, FIBRE, ALUMINUM, HARD RUBBER, MAGNESIUM, MONEL, CHROME TOOL STEEL . . .



ORDER TODAY, Dept. B-108

Model	Length	Width	Thick	Dia.	Price
No. 6	6⅜"	1⅝"	¼"	⅜"	$28.00
No. 6A	6⅜"	1⅝"	⅛"	⅜"	$30.00
No. 10	10"	1⅝"	¼"	⅜"	$38.00
No. 14	14"	1⅝"	¼"	⅜"	$55.00

Pat. No. 2477297

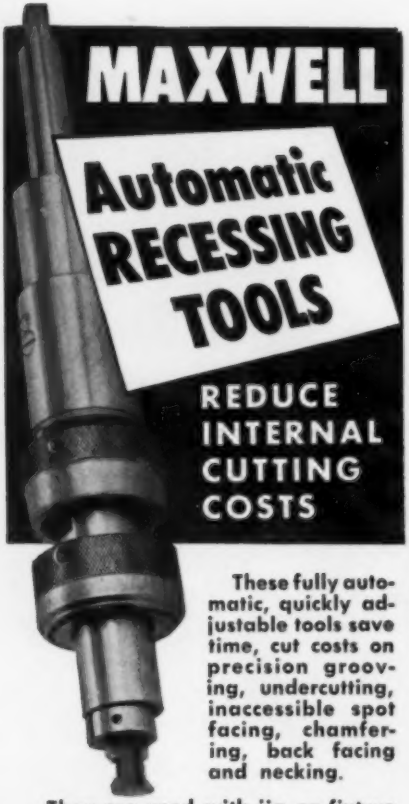
Multiplies the uses, increases the value of your magnetic chucks. Gives you the time-saving advantages of magnetic chucking when machining non-magnetic materials. Easy to use.

Precision-made low-cost Magna-Vise quickly pays for itself. Once you've used it, you won't want to be without it.

MAGNA-LOCK INCORPORATED, BIG RAPIDS, MICHIGAN, U.S.A.

Sine Chucks . . . Parallels and V-blocks . . . Magna-Vise

Use postpaid card. Circle No. 337



These fully automatic, quickly adjustable tools save time, cut costs on precision grooving, undercutting, inaccessible spot facing, chamfering, back facing and necking.

They are used with jig or fixture on automatic or manual feed machines. Long-life circular form cutters, or tool bit holders with tool bits may be used. Location and diameter of recess are individually controlled by stop collars, adjustable to within ± 0.001-inch. Five sizes available to pilot into 1" to 2¼" bushings. Furnished with shank to suit.

WRITE TODAY FOR BULLETIN NO. J-F

1151-MC



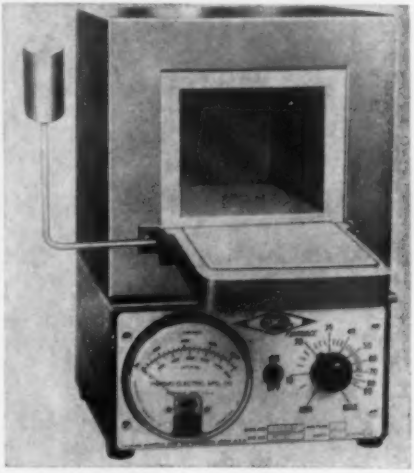
THE MAXWELL COMPANY

493 E. 5th Ave. Ashtabula, Ohio

Use postpaid card. Circle No. 338

Electric Furnaces

The four completely new, utility-size electric bench-type furnace models, type 1300, have the same chamber dimensions, case size and general construction, but differ in voltage requirements (115 or 230) and in mode of temperature control. They are designed for laboratory testing and experimentation, and process control and small-unit heat-treating.



Furnaces for laboratory testing.

The spacing of the element wire through the refractory plate, with its high heat conductivity, results in quick heat-up and even distribution of heat.

Furnace models F-1315T and F-1310T have a built-in Temcometer-type controller which provides wasteless control of furnace temperature, which can be held from 350° F. to maximum.

In all models, chamber temperature is indicated through a thermocouple connected to a pyrometer having a double scale and calibrated in 50° increments to 1250° C. and 2250° F.

Thermo Electric Mfg. Co., Dubuque, Iowa.

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BREAK THE "PROFIT SQUEEZE" WITH BRIGHTBOY

Improve Your Product at Lower Cost

The unique working action of multi-use Brightboy (*abrasive and rubber, function simultaneously*) produces a finish that frequently constitutes the final polish.

Brightboy is a STOCK line, made in a wide range of Silicon Carbide and Aluminum Oxide grains. Each in grades from extra fine to extra coarse, in soft, firm and tough rubber binders. The compound is in the rubber. *No muss! No fuss!*

Brightboy numbers are JOB-MATCHED to your finishing requirements; often take the place of "special" compounds; prove their versatility on regular and special finishing. A Brightboy finish frequently constitutes the final polish, without necessitating an extra operation.

Made in WHEELS, STICKS, RODS & BLOCKS for machine and manual applications. Ask your dealer to recommend the Brightboy numbers for your needs, and for the Brightboy catalog listing applications and machine speeds. Write for "Notes From The Brightboy Service Engineer," describing Brightboy applications and uses.

Write for FREE SAMPLE
BRIGHTBOY HAND PIECE
for quick-job cleaning

There Are Many
NEW APPLICATIONS
Never Before Associated With Finishing
FOR TODAY'S
RUBBER-CUSHIONED
ABRASIVES!

Replacing
Costlier,
Slower
Methods



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N. J.

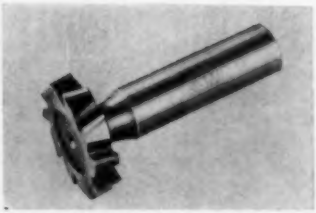
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

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Staggered Tooth Woodruff Keyseat Cutters

All standard sizes of the staggered tooth woodruff keyseat cutters, from No. 201 to letter G, are now available from stock. The complete set, from 1/4" diameter and 1/16" thickness to 1½" diameter and ⅜" thickness, may be had in a special hardwood box for use as a tool crib set. All are of high speed steel with ½" shank.



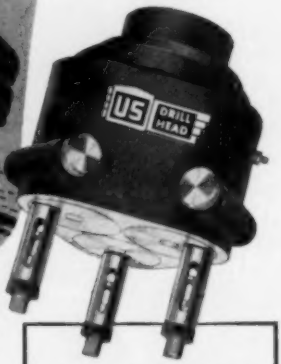
Keo Cutters, Inc., 25040 Easy St., Warren, Mich.

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LOTS OF HOLES . . .

FAST?



For 2, 3 or 4 spindle drilling you can do it better, faster, at lower cost with U. S. Standard Adjustable Heads.

More reserve stamina built in . . . antifriction bearings . . . high alloy steel spindles and shafts . . . heat treated and shaved gears . . . more than ample spindle bearing . . . parts run in oil (oil-mist for speeds around 4000 rpm).

Standard Adjustable 3-spindle head, all spindles adjustable. Five styles—2 to 4 spindles, up to 1⅜" drill sizes, up to 15" bolt circles.

Write for catalog AD-57

US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

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HOW TO SAVE MONEY AND TIME ON SPINDLE REPAIRS

Make POPE *Your Spindle Repair Department*

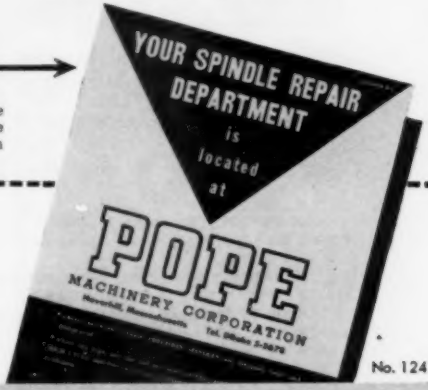
POPE Repair and Rebuilding Service applies to any size, any make of anti-friction bearing Spindles — belt driven, motorized or high cycle.

POPE puts your Spindles in shape *quickly*, at lowest cost. *You* okay the cost figures before the work is done.

POPE repair work is done by the same expert craftsmen that build Pope Precision Spindles, and in the same air cleaned, air conditioned assembly department. The job will be done *right* the first time — *right* bearings, *right* preload, *right* lubrication, *right* assembly, *right* balance.

GET THIS!

Bulletin R-2 tells you *how* and *why* Pope Precision spindle repair and rebuilding service save you money and time. Clip the coupon and get a copy by return mail.



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261 River St., Haverhill, Massachusetts

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No. 124

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ENGINEERS AND BUILDS STANDARD AND SPECIAL PRECISION ANTI-FRICTION BEARING SPINDLES FOR EVERY PURPOSE

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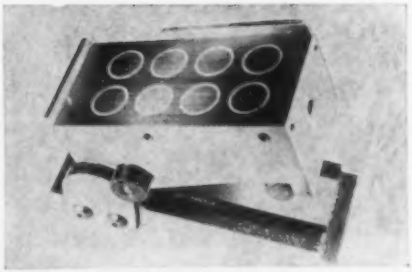
Magnetic 5" Sine Plate

A 5" sine plate, with built-in permanent magnetic chuck, speeds light machining or inspecting of angles on small ferrous parts. The 5" x 3" top surface provides ample working area and rails on side and end make accurate locating of pieces easy.

The plate is available with or without a solid oak case.

Bald Eagle Corp., 356 Cedar St., St. Paul 1, Minn.

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Magnetic 5" sine plate.

FOR FASTER GRINDING at LOWER COST

USE A.I.T. Diamond Wheels for all Carbide Grinding

RESIN **B-60** Cup Type Diamond Wheel



The exclusive B-60 Bond used in A.I.T. bonded diamond wheels has been field tested in over 400 plants. We can *prove* these superior advantages to you in YOUR plant:

- Faster grinding
- Up to 40% longer wheel life
- One grit size wheel can be used to hog and finish—for extra savings.
- Wheel grinds cooler—does not fracture carbide
- Corners stay sharper longer
- No re-dressing of diamond surface
- NEW BACKING dissipates heat faster
- No down-time for dressing inside body section

Write today for new, FREE catalog and prices

A.I.T. Diamond Tool co.

8205 N. KIMBALL AVE.
SKOKIE, ILLINOIS

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T-J spacemaker cylinder

Quality Engineered

to give quality results

with Extras . . .
at No Extra Cost!



You get more—much more—when you specify and use any of T-J's complete line of Spacemaker cylinders. The Spacemaker is engineered to give you better, more accurate, and longer service—offers, exclusively, many extras . . . that are STANDARD, AT NO EXTRA COST!

Designed to eliminate tie-rods, providing greater strength . . . saves space . . . reduces manhours and costs in all push-pull-lift operations. IMMEDIATE SHIPMENT in a wide range of styles and capacities, with 64,000 combinations. Write for Bulletin SM 155-3 with complete engineering details. The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON
BUILDERS AIR AND HYDRAULIC CYLINDERS, CUTTERS, CLINCHERS

METAL PISTON ROD SCRAPER . . . Standard at No Extra Cost!

NEW "SUPER" CUSHION FOR AIR . . . Standard at No Extra Cost!

CHROME PLATED CYLINDER BORES AND PISTON RODS . . . Standard at No Extra Cost!

ONE PIECE PISTON . . . Standard at No Extra Cost!

NEW "SELF-ALIGNING" MASTER CUSHION FOR HYDRAULIC USE . . . Standard at No Extra Cost!

NO TIE-RODS TO STRETCH . . . Standard at No Extra Cost!

STREAMLINED DESIGN . . . Oil Pressure to 750 P.S.I.—air to 200 P.S.I. Standard at No Extra Cost!

FORGED SOLID STEEL HEADS . . . Standard at No Extra Cost!

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Precision Boring in The Palm of Your Hand



Boring tool with offset feature to take-up for tool grinding.

The A-1 miniature Deka-Bore boring head will hold quills up to ½" in diameter, and its small size in no way detracts from its accuracy. It also has a calibrated micrometer screw that can offset the tool slide to compensate for tool grinds. Adjustments up to ⅛" can be made on the diameter.

The head incorporates Precision's patented Deka-Dial, which provides positive .0001" adjustments plus offset adjustments to take-up for tool grinding, according to the announcement.

Precision Tool & Mfg. Co., 1305 S. Laramie Ave., Cicero 50, Ill.

Use postpaid card. Circle No. 94

Portable Transfer Feed



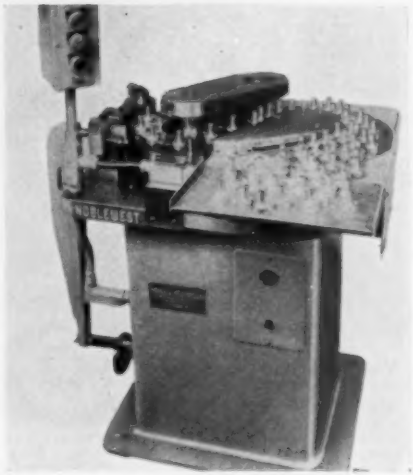
Most straight side presses can now be converted to automatic transfer feed drive operation by means of a self-contained transfer feed console. The transfer feed may also be used to move material through a series of presses. It is operated through one power take-off from the press crank, or may be independently powered and set up to control the press cycle.

In operation, aluminum feed rails are driven from right to left, and may be used to push or pull work through the press. The feed stroke is adjustable from 15" to 30" in increments of 1".

E. W. Bliss Co., Canton, Ohio.

Use postpaid card. Circle No. 95

Marking Machine



A high speed automatic Dual-Dial machine is designed specifically for marking thin wall cup-shaped parts for tubes. Model 482, illustrated, is tooled for marking a well-known garden hose accessory. It roll marks permanent indents of part numbers into each workpiece at a production rate in excess of 5000 pieces per hour.

The Noble & Westbrook Mfg. Co., East Hartford, Conn.

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SYNTRON
Lapping Machines



GIVE YOU:

- Metallographic finishes
- Precision flatness
- In production quantities



Loading Syntron Lapping Machine with metallic sealing rings.

Easier lapping and polishing parts and samples with more uniform results

SYNTRON Lapping Machines provide a simple, easy mechanical way to lap and polish samples and parts.

Produce lap flat surfaces and metallographic finishes with absolute uniformity in production quantities.

Simplicity of design with no obstructions makes loading and unloading easy. High-speed controlled vibration provide more effective lapping with low maintenance.

Lap parts and samples fast, easy in production quantities with SYNTRON Lapping Machines.



Production lapping of sealing rings.

Write for FREE Catalogue Data

SYNTRON COMPANY
300 Lexington Ave. Homer City, Pa.

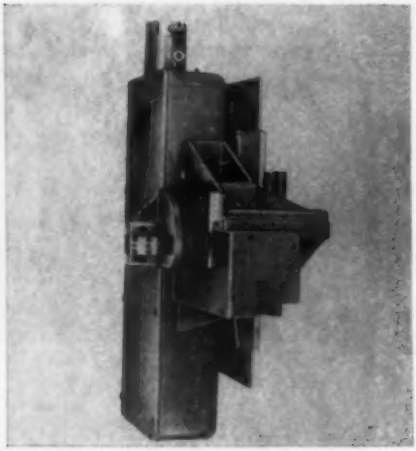
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Wheel Dresser for Surface Grinders

The accuracy of the Model 105 hydraulic contour wheel dresser is said to be possible because of an inclined plane cam mechanism. The unit features automatic hydraulic operation. It has a continuous uninterrupted cut across the wheel, producing a perfect blend of all radii and tangents, according to the announcement.

Hoglund Engineering & Mfg. Co., 343 Snyder Ave., Berkeley Hts., N.J.

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Dresser location is in water pan of surface grinder.

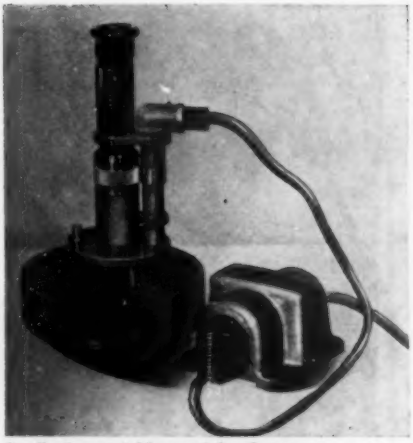
Scratch Investigation Microscope

The instrument measures scratches up to .025" deep on flat or curved surfaces, to an accuracy of .001".

The unit is used for checking surfaces on aircraft canopies, missile surfaces, propellor blades or wing skins. A camera attachment available permits the making of photographic records on 35mm. roll film.

Engis Equipment Co., 431 S. Dearborn St., Chicago 5.

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Small size portable scratch microscope.

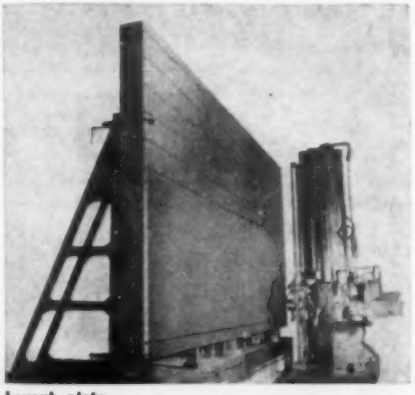
T-Slots Offered in 10'x20' Layout Plates

The T-slotted plates feature an adjustability of .002" in any direction. They are designed to facilitate layout operations and/or to simplify fixture attachments.

The layout plates, with machined T-slots in any arrangement specified, come in sizes to 10'x20' in one piece or sections.

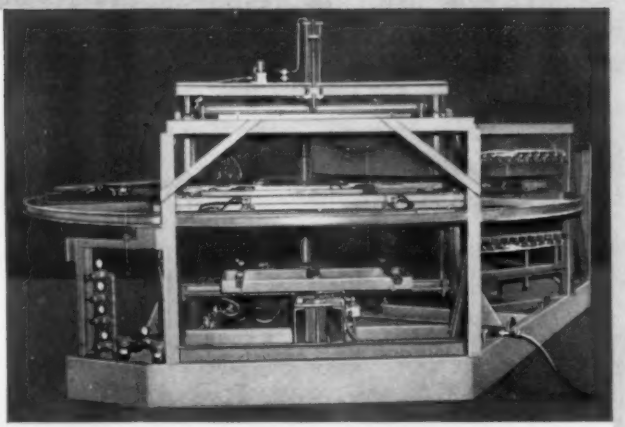
Machine Products Corp., 6771 E. McNichols Rd., Detroit 12, Mich.

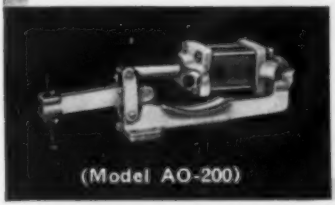
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Layout plate.

COOL IDEA





(Model AO-200)

FOR REFRIGERATOR MANUFACTURERS

Knu-Vise air-operated clamps are featured on a new 3-station automatic machine developed by the Brown Machine Company, Beaverton, Michigan, for vacuum forming inner door panels and other refrigerator parts at a maximum production rate.

The machine is completely automated with air clamps, mold table, vacuum system and fans, and rotating mechanism all operating from a single switch. 100 panels per hour—as big as 42″ x 72″—can be produced.

Quality standards are so high that only dependable Knu-Vise air-operated clamps can be used. Take a tip—investigate Lapeer today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

3052 DAVISON ROAD
LAPEER, MICHIGAN

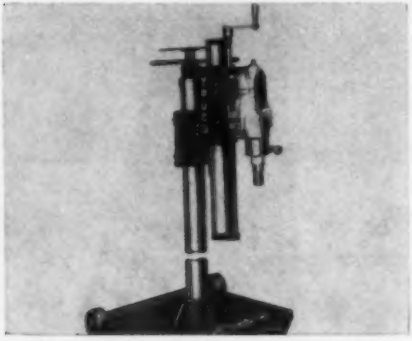
WESTERN DIV.: PECK and LEWIS CORPORATION
4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7146

CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

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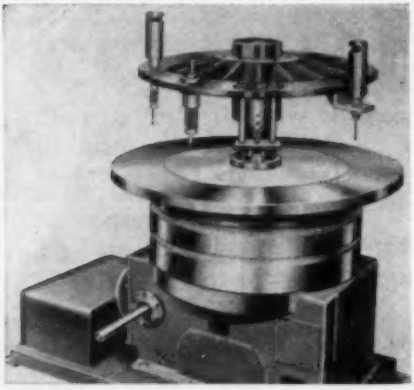
Diamond Drilling Machine

The Truco Model A drilling machine consists of an extra heavy-duty drill motor operating at 1000 rpm and capable of clean, high-speed drilling of holes 1" to 5" O.D. in all kinds of masonry materials including reinforced concrete. A water swivel, integral with the drill motor, supplies water to the diamond drill to flush away cuttings.



Truco Water Swivel Div., Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 38, Mich.

Use postpaid card. Circle No. 100



Turret Indexing Machine Chassis

A Series "M" line of standard turret indexing machine chassis, for use in the economical construction of special automatic machines requiring a rotary intermittent motion, has been announced. Important features of the chassis include an optional "umbrella" type tool mounting plate that is vertically actuated during the dwell time of the turret indexing cycle.

The chassis are offered with turret diameters from 36" to 54", and with a choice of 6 to 32 index positions.

Swanson-Erie Corp., 814 E. 8th St., Erie, Pa.

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Overload Clutches

A line of Safe-Torque mechanical overload clutches is available for use as a subassembly or for attachment to a source of power. Two standard ratings of precise torque control clutches are currently available: 0 to 84 in.lb. and 48 to 120 in.lb. Other models have been developed up to 800 lb.ft.

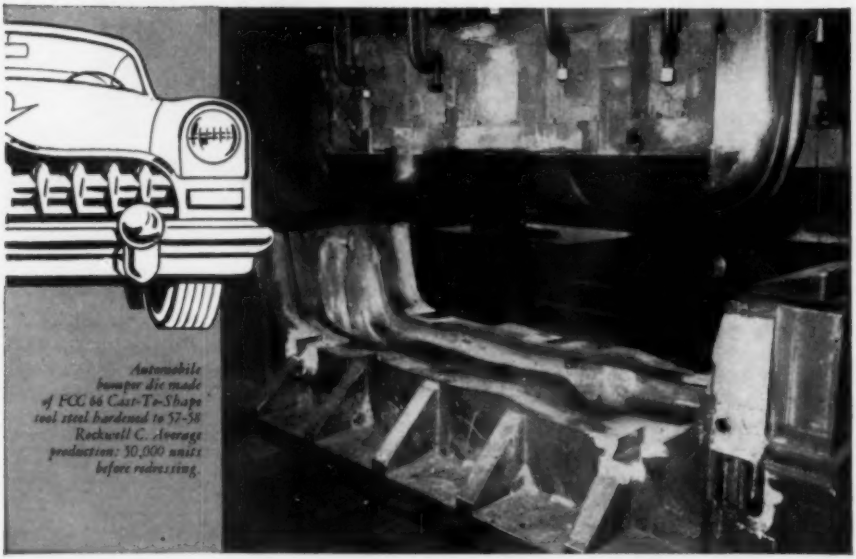
Two general types of clutches are included: the one-shot and the continuous over-riding type.

The overrunning roller drive of the clutches provides instantaneous release whenever the preset torque is exceeded.

Scully-Jones and Co., 1901 So. Rockwell St., Chicago 8, Ill.

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Try this money-saving method that auto-makers use



Automobile bumper die made of FCC 66 Cast-To-Shape tool steel hardened to 57-58 Rockwell C. Average production: 30,000 units before redressing.

A-L CAST-TO-SHAPE TOOL STEELS

Auto makers, too, are included in the long list of manufacturers enjoying the advantages and economies of A-L Cast-To-Shape tool steels. By this modern, money-saving method of tool and die making, it is possible to cast even intricate shapes to within an eighth of an inch of finished size. The savings in time and material over that of machining from solid stock are readily apparent.

A-L Cast-To-Shape tool steels are offered in a variety of grades, and are electrically melted to precise laboratory standards. They are remarkably resistant to abrasion and possess great compressive strength. In many cases, they out-perform tools and dies made from solid bars and forgings.

Remember, with A-L Cast-To-Shape tool steels, you buy less steel originally, and you have less machining to do for finish. Ask your A-L representative about them TODAY . . . or write Allegheny Ludlum Steel Corporation, Forging and Casting Division, Wanda and Jarvis Aves., Detroit 20, Mich.

SEND FOR THIS NEW CATALOG
"FORGING AND CASTING PRODUCTS"

Contains the latest information on FCC Air Hardening, Oil Hardening and other Cast-To-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections and Smooth Hammered Forgings in a wide range of tool and stainless steels. *Don't wait—get your copy NOW.*

Write Today
ADDRESS DEPT. MB-10

MSW 6076

For complete MODERN Tooling, call
Allegheny Ludlum

AL® PURE TOOL STEELS SINCE 1854

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Tantung Tipped Shell End Mills Offers More Heat Resistance

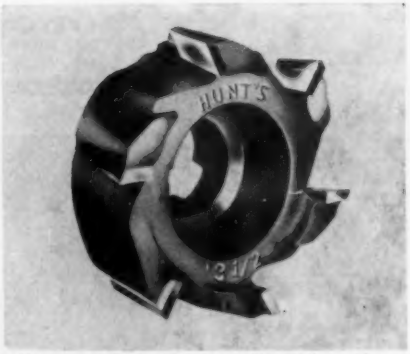
The cutters of the shell end mills have six teeth incorporating a 10° positive and a 10° radial rake. Each tooth is face ground. Adequate chip clearance is provided.

The cutters are Meehanite cast, with tantung tips. The Meehanite is said to insure adequate strength with a minimum of vibration and deflection. The tantung is reported to hold keen cutting edges, which provides much of the heat and abrasion resistance of carbide.

The tips can easily be replaced or set out. Sharpening or grinding can be done with standard tool room grinding wheels.

Hunt's Grinding & Manufacturing Co., 6300 So. San Pedro St., Los Angeles 3, Calif.

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Cutters are Meehanite cast with tantung tips.

Giant Band Saw Rates 38″ x 42″ Stock

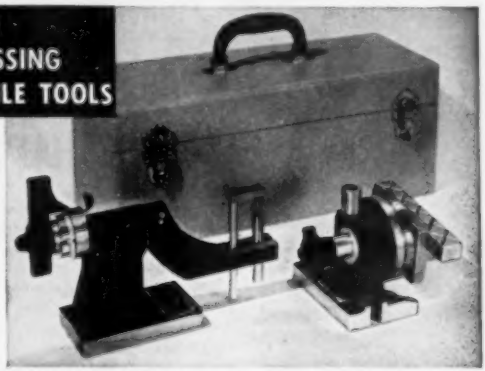
The band blade in the model TB-58-1 machine rides over four guide wheels in the upper hydraulically-supported frame. It is motor driven for variable

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50

(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015″ to 1.750″ on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2″ of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

Distributorship available in select territories.

ROTH FUSS TOOL COMPANY

BOX 2694, ELMWOOD STATION PROVIDENCE 7, R. I.

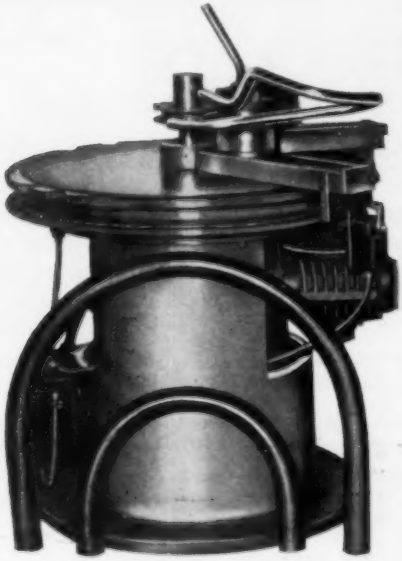
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tricky

BENDS ARE EASY WITH PEDRICK BENDERS

Complicated pipe, tube or structural metal bends are a cinch with Pedrick Production Benders—on either a production or job basis.

Show us your problem—with drawings, if possible—and we'll show you the answer. Write PEDRICK TOOL AND MACHINE CO., 3640 N. Lawrence St., Phila. 40, Pa. Dept. 3.





FREE "PEDRICK LINE" BULLETIN. WRITE TODAY.

PEDRICK production benders

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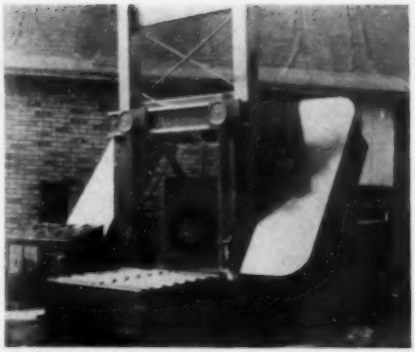
speeds from 30′ to 140′ per minute. The band frame is mounted on rollers to guide it and minimize friction.

The work is clamped by a hydraulically-operated variable pressure vise. Blade tension is hydraulically maintained at proper pressure on blade wheels. The assembly shown provides 42″ of clearance under the blade.

The machine is suited for such work as cutting all grades of steel. It can be built to meet special requirements.

W. F. Wells & Sons, Three Rivers, Mich.

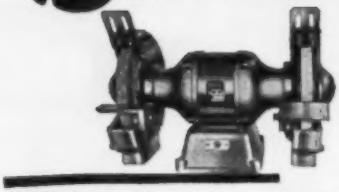
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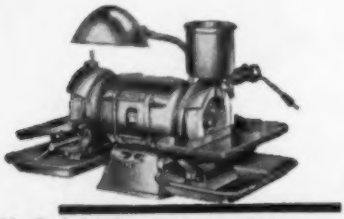
Machine shown provides 42″ clearance under blade.

LESS VIBRATION . . . GREATER ACCURACY!

Baldor GRINDERS



183-10″ Grinder. Every part oversize and ruggedly constructed for hard, continuous use. 1 HP, 1725 RPM. Wheels: 10″ x 1″ x ⅞″—36 and 60 grit. Ideal for grinding large, odd-shaped pieces. **$150.00.**



Carbide Tool Grinder. Sharpens quickly, accurately. Reversible ½ HP motor withstands repeated overloads. 1½″ wide wheels **$189.00.**

Dynamically balanced Baldor Grinders provide smoother operation, far greater accuracy. Assure hours of relaxed, fatigue-free operation. Rugged . . . durable . . . the first choice of old hands who have tried 'em all.

- Lubricated for life ball-bearing motors never need servicing!
- Splash proof, totally enclosed motors protect against dust, dirt, grit. Can't cause trouble
- **Models for every need! ¼ to 3 HP, 6″ to 12″ individually balanced wheels. Bench and pedestal types.**
- Every model fully guaranteed

Write for Bulletin 321-P

BALDOR ELECTRIC CO.

4353 Duncan Ave. **St. Louis 10, Mo.**

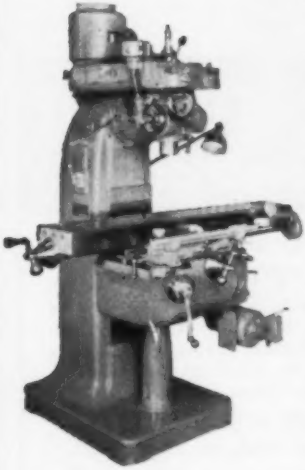
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Produce MORE... Produce it BETTER!

ON THESE IMPROVED ECONOMICAL

INDEX VERTICAL MILLS

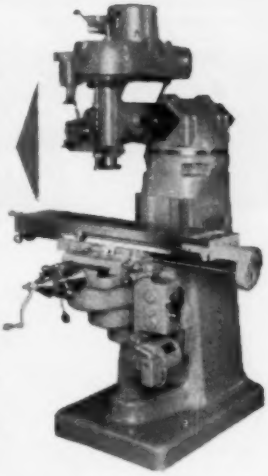
Super "55" MILL



1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use . . . No need to re-indicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

"45" MILL



INDEX MACHINE CO.

540 N. MECHANIC STREET JACKSON, MICHIGAN

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Power Scraper Features Adjustable Stroke



Figure scraping is eliminated.

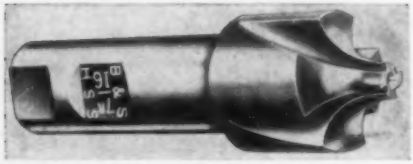
The new Biax scraper is designed for all scraping processes on sliding and locating surfaces. Its adjustable stroke makes this wide range of use possible; for example, a large stroke is used for trimming or rough scraping, and a medium stroke for fine scraping and a small stroke for finishing.

The scraper is reported to give advantages as a finished pattern and elimination of figure scraping.

Borel & Dunner, 19313 Farmington Rd., Livonia, Mich.

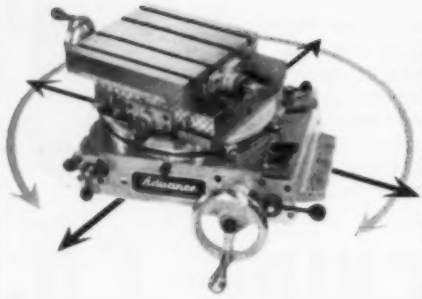
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End Mills Round Corners In Inaccessible Areas



Fourteen corner rounding shank type end mills, ranging in size from 1/16"

Advance CROSS-SLIDE ROTARY TABLE
for Vertical Milling Operations



High-Priced RESULTS for LOW-COST Investment

The Advance Cross-Slide Rotary Table permits fast, precise positioning of work-pieces from **one set-up.** Eliminated is the series of error-inducing multiple set-ups as done on conventional rotary tables.

Save 50% to 90% of Set-Up Time on Vertical Milling Precision, Heavy-duty Construction

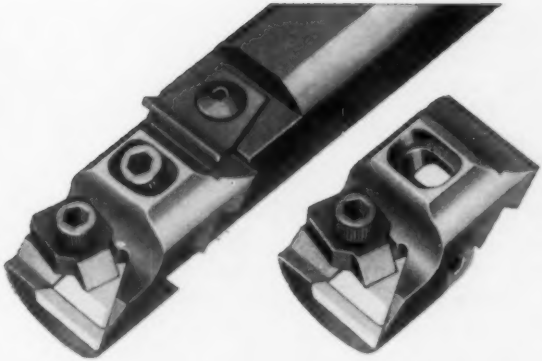
Hundreds of Satisfied Users in Tool and Die, Missile and Aircraft, Nuclear, Electronics and Production Work

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ADVANCE PRODUCTS CORP.

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Here is the new Kennametal Adjustable-Head Boring Bar that aroused much interest at the A.S.T.E. Show in Philadelphia. Note placement of the cutting point at the bar's center line.

Now! Kennametal* Boring Bars with adjustable and interchangeable heads

No need for adjustable head on machine . . . adjustment is made on the tool itself

Featuring the Kendex*"throw-away" insert principle, Kennametal Adjustable Boring Bars are now available with two and three heads that can be used interchangeably on two different styles of bars. Both bars are made in seven diameters, ranging from 1 to 2½ inches. One style is made with a solid steel shank, while the other utilizes the exclusive K-Bar construction to provide greater rigidity for high precision boring jobs.

The Kennametal Adjustable Boring Bar is ideally suited for all types of chucking machines, semi-automatic lathes and precision boring applications on many other machines. This design brings new ease of simple, accurate adjustment, without sacrificing rugged strength or rigidity. A unique gib, plus the improved method of anchoring the cutting head to the bar, gives maximum strength. At the same time, the fine, precision adjustment permits simple setting and positive holding of close tolerances.

Standard Kendex throw-away inserts provide the many mechanical advantages and cost-reducing features of Kendex tooling. The snug fitting shim and chipbreaker leave no gaps in which chips can jam. For maximum support and durability, both are "all carbide" . . . as strong as the insert itself.

Get more information on the new line of Kennametal Adjustable Head Boring Bars. Call your Kennametal Representative, or write KENNAMETAL INC., Latrobe, Pa.

*Trademark



K-Bar cross section, showing steel core encased by Kennametal sleeve.

FOR THOSE EXTRA TOUGH OPERATIONS

. . . the new Kennametal adjustable head design is also available as a "K-Bar" . . . encased with a solid Kennametal sleeve to provide the rigidity necessary to stop vibration and chatter.

Almost as rigid as a bar of solid carbide, the K-Bar prevents taper, weaving and drag-out scoring, reduces chipping and chatter damage to cutting tips. Eliminating these problems thus permits successful use of harder grades of carbide inserts. On many jobs, a K-Bar can remove as much metal in one pass as on two or more passes with a steel bar.

3178A

INDUSTRY AND
KENNAMETAL
...Partners in Progress

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to ½" radius are available individually or in a set of eight, mounted in a wooden block. These cutters are especially versatile for rounding corners where arbor type cutters make working area inaccessible.

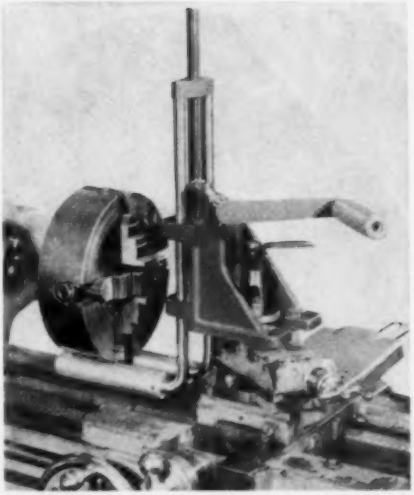
Cutting Tool Div., Brown & Sharpe Mfg. Co., Providence 1, R.I.

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Portable Chuck Lift Dismounts Chucks Easily

Chucks and faceplates for lathes can now be mounted or dismounted easily with the Easton portable chuck lift. It is also useful for putting heavy pieces of steel into the chucks, or between centers for machining. Injury to the operator and damage to the lathe are eliminated with use of the chuck lift.

Chucks up to 18 or 20 inches in diameter can be lifted.



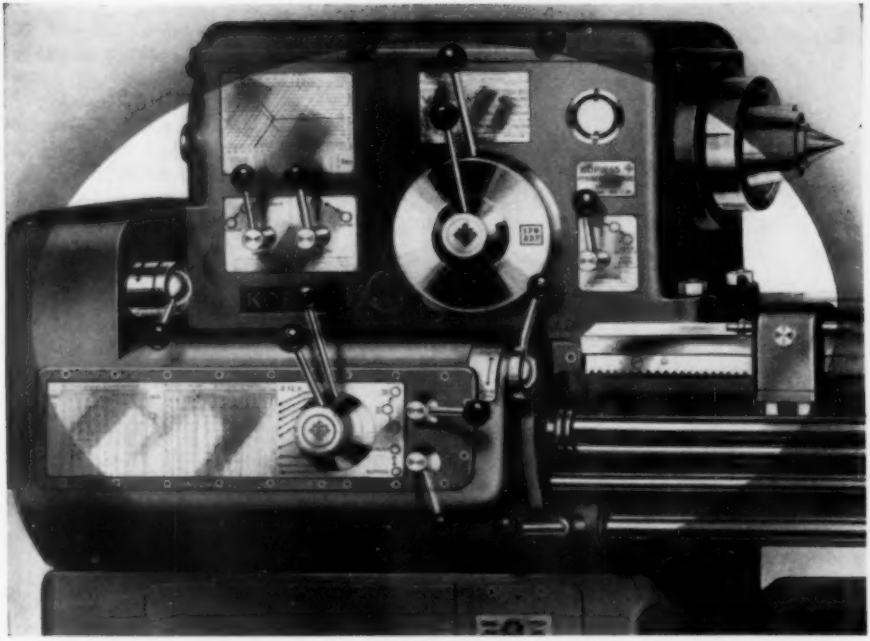
Chuck lift prevents injury to operator and lathe.

Easton Tool & Machine Works, Rockford, Ill.

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Use postpaid card. Circle No. 353



Detail of one of the fine lathes made by Kopings Mekaniska Verkstad. Sweden

KOPING

IS A "TOP LATHE BUY" BECAUSE OF

1. Lasting investment—Koping machine tools are manufactured to the highest standards; check with our customers.
2. High productivity and versatility—S12A has 30 HP, 116 feeds, cuts 81 different threads down to 1/8 of a thread per inch without gear change, and in addition, 71 different millimeter threads.
3. Reasonable price—S12A x 60", $15,130.00 f.o.b. N.Y. 24" swing.
4. Good delivery.
5. Service—Koping machines are guaranteed for a period of 10 months. Spare parts and service immediately available.

★ ★

These are some other KOPING types

S8S	16"	swing,	8	H.P.,	$5245	(40")
S8SG	16"/27"	swing,	8	H.P.,	$5845	(40")
S10S	20"	swing,	8	H.P.,	$5695	(40")
S10SG	20"/31"	swing,	8	H.P.,	$6295	(40")
S8B	16"	swing,	15	H.P.,	$7245	(40")
S10B	20"	swing,	15	H.P.,	$7595	(40")

Write for our general catalog

★ ★

THE KOPING COMPANY IS 100 YEARS OLD AND A SUBSIDIARY OF A. B. VOLVO

KOPINGS MEKANISKA VERKSTADS A. B. SWEDEN

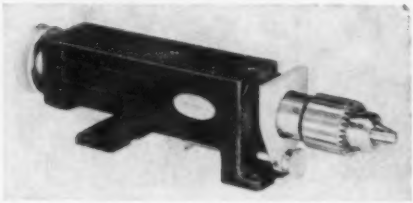
U.S. Rep.: Homestrand, Inc., 9 Addison St., Larchmont, N.Y.

Sales and Service

Dealers in all principal metalworking areas

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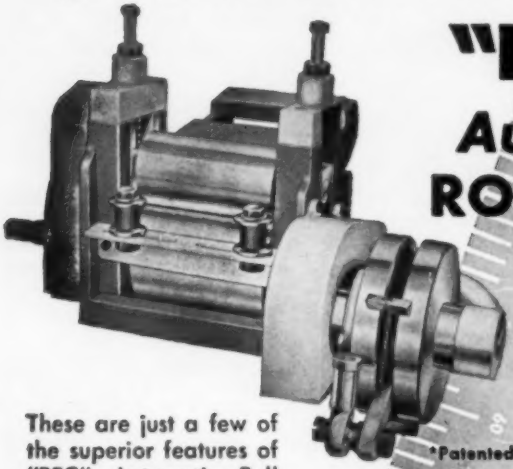
Low Cost Drill Head Size of Cigarette Carton



The feed and retract strokes of the small-size drill head are powered by a built-in air cylinder with a maximum 2" stroke. Drilling capacity is from a No. 80 drill to a 3/16" diameter drill in mild steel.

Slightly larger than a carton of cigarettes, the Bellows-Locke Model 22A drill head is of value in close-quarter applications as the machining of light-gauge steel, non-ferrous metals and the

Even Without Pilots or Finger Stops



"R F C"
Automatic
ROLL FEEDS*
Control Feeding To Utmost Accuracy!

*Patented

These are just a few of the superior features of "RFC" Automatic Roll Feeds. There are many other wanted features designed to increase precision production.

Write for our new illustrated brochure covering 39 standard feeds and hundreds of special type feeds.

- No Ratchet or Pawls To Wear Down
- Can't Slip—Each Wedge Has 4 Points of Contact
- One Piece Shaft and Roll Ground From Solid Bar To Maintain Perfect Alignment



Roll Feeds Corp.
ASHTON, R. I.
MANUFACTURER OF QUALITY FEEDS FOR POWER PRESSES

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working of wood, plastics and rubber.

The recommended maximum spindle speed is 8,000 rpm. An optional high speed spindle assembly for 12,000 rpm maximum is available.

The drill head sells for $95.00 for the basic unit (less pulley and chuck).

The Bellows Co., 230 W. Market St., Akron 9, Ohio.

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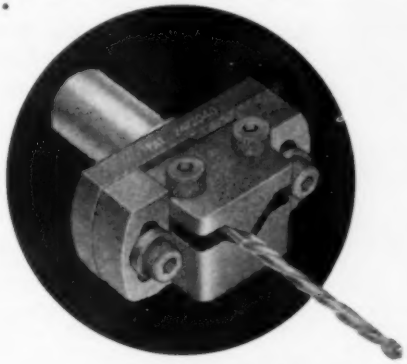
Subminiature Relay

A subminiature, lightweight, armature type relay, called the KM, occupies about 0.5 cu. in., weighs 5/8 oz. and operates on as little as 750 milliwatts. It provides switching arrangements up to 3PDT.

Some present applications include automatic traffic control systems and automatic weather stations.

Potter & Brumfield, Inc., Princeton, Ind.

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in half the time

Brookfield Tool Holders

make tool set-ups easy!

Now, without bushings or collets, on the first try you can set up drills, counterbores, reamers or cutters for almost any machining operation. Precision ground V-jaw vises, Brookfield Tool Holders make even toughest set-ups a cinch. With one wrench, insert the tool, tighten the jaw, then float the tool into dead center position and tighten. It's as easy as that!

FREE! *Descriptive illustrated brochure, plus price and specification lists.*

BROOKFIELD, INCORPORATED

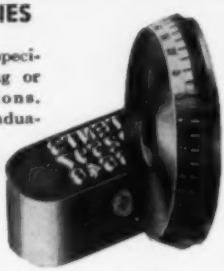
STOUGHTON 112, MASSACHUSETTS

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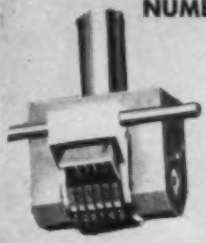
MARKING TOOLS FOR EVERY NEED

INDENTING DIES

Designed to your specifications—for rolling or stamping operations. Engraved with graduations, knurls, tradenames, or any lettering you require.



NUMBERING HEADS



For indenting, embossing or debossing characters in numerical sequence. Constant reading matter may also be combined with the changeable.

MACHINES

Matthews' standard machine line features equipment to stamp, roll, emboss or blast-etch . . . also, integrated equipment designed to your present production.



JAS. H. MATTHEWS & CO.

3946 Forbes St. Pittsburgh 13, Pa.

Offices in principal cities.
Write, call or TWX PG 424

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The pump casting, pictured, is having its flange lapped to produce a leak-proof joint, allowing gaskets and joint cement to be eliminated.

Lapping Machine Delivers True Contact Surfaces

A 24" semi-automatic lapping machine is reported to deliver flatness to less than one light band (.00011") and a surface finish as low as 1 micro-inch rms. It features a fully automatic work cycle, including application of the lapping compound, a variable speed drive for selecting best lapping rate, and specially designed magnetic truing rings which maintain continuous plate flatness while the machine is in operation.

Material which can be successfully lapped includes the toughest alloys, which can be lapped in the hardened state, and non-ferrous metals as brass, bronze and aluminum.

The lapping table speed is infinitely variable between 16 and 76 rpm.

Taft-Peirce Mfg. Co., Woonsocket, R.I.

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CAMS

To Your Specifications except Screw Machine Cams

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

25 LOCUST AVE. ROSELAND, N.J.

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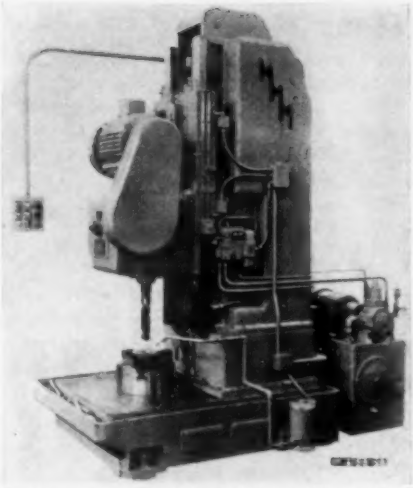
Vertical Drilling And Boring Machines Available Up to 60 HP

The drilling and boring machines can accommodate many types of heads, fixtures, indexing tables and bases, for they are adaptable to a wide variety of machining operations.

The feed valves are cam-actuated for positive action, and the slide-mounted cams are said to provide fast stroke setting changes. The column can be arranged with a series of risers for a wide range of large work.

The machines are available with capacities to 60 hp and in 15" and 30" strokes. The vertical slides are 26" wide, 48" long and 20½" across the ways. The spindle, 1800 rpm, is driven by a 15 to 30 hp motor. The hydraulic motor is 1200 rpm, 5 hp.

The Motch & Merryweather Machinery Co., 1250 E. 222nd St., Cleveland 17, Ohio.



Feed valves are cam-actuated for positive action.

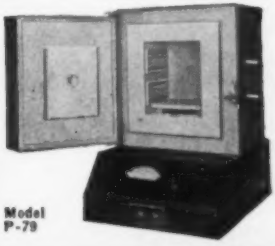
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PRODUCED AND PRICED RIGHT FOR YOUR ELECTRIC FURNACE NEEDS

DYNA-TROL

MODEL NO.	FIRING CHAMBER (H.W.D.)	PRICE (300° to 2000°)	PRICE (400° to 2300°)
P48	4½"x4½"x8"	$90.00	$110.00
P79	6"x6"x9"	$205.00	$225.00
P918	9"x9"x18"	$480.00	$528.00
P414	14"x14"x14"	$525.00	$603.25
P124	12"x12"x24"	$715.00	$822.25
P818	18"x18"x18"	$775.00	$887.50
P136	18"x18"x36"	$1125.00	$1312.50

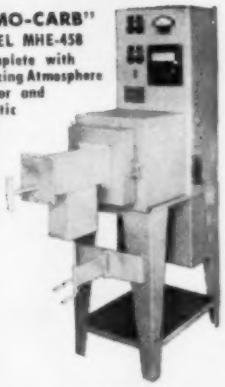
Automatic Controls Available on all Models



Model P-79

- Infinite zone temperature control
- Zone temperature indication by Pyrometer Selector Switch
- Automatic hold and cut-off instrument available
- Patented element holders
- Infinite variety of time-temperature curves obtainable
- Rugged construction

"ATMO-CARB"
MODEL MHE-458
Complete with Carburizing Atmosphere Generator and Automatic Control



$1325.00
Other Sizes and Arrangements Available

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MANUFACTURING CO.
Chester 71, Pa.

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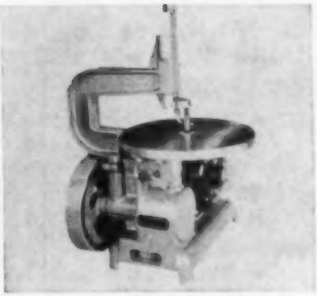
Sawing Machine

An ordinary mechanic can operate the contour sawing and filing machine, which is said to shape dies and tools to dimensions speedily and accurately. Hand filing or other semi-finishing operations are not required.

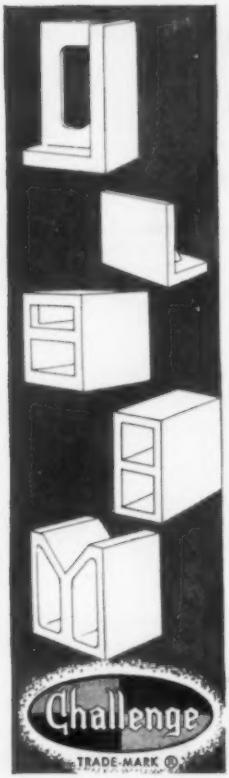
The machine is available in five types, bench or pedestal.

Oliver Instrument Co., 1409 E. Maumee St., Adrian, Mich.

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For MORE ACCURATE MACHINE SET-UPS



CHALLENGE

ANGLE PLATES • ANGLE IRONS

BOX ANGLES • V-BLOCKS

and BOX PARALLELS

These Challenge products provide a practical means of clamping and holding work for precise measurement and machining. Many machinists also use these units not only as a base for their precision fixtures but as a part of the fixture itself — thus increasing accuracy while eliminating a step of manufacture.

The precision that is part of every Challenge unit extends all the way up to 10 x 20 ft. Surface Plates. Whatever your precision problem may be—standard or special sizes —Challenge has the best answer for you. See the complete line by writing for the latest Challenge Precision Catalog or ask your Industrial Distributor.

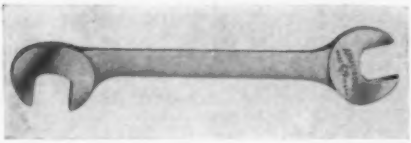
SE-117

THE CHALLENGE MACHINERY CO.

Grand Haven, Mich. Dept. MTBB-10

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15° & 75° Miniature Wrenches



5½" miniature wrench.

The two 15° and 75° angle opening miniature wrenches are drop forged of alloy steel, carefully heat treated, and chrome plate finished.

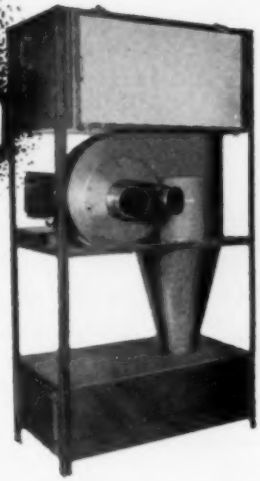
The tools have various sized openings from 3/16" to 5/8". The No. 1136 has 9/16" openings; the No. 1140 5/8" openings. Both are 5½" long.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago 46, Ill.

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EFFICIENT–LOW COST

Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP® STOPS DUST

37 STANDARD MODELS TO CHOOSE FROM

• READY TO USE

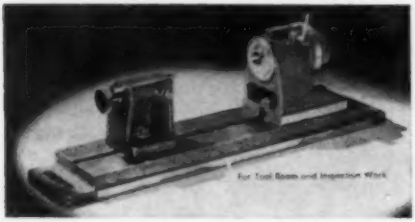
Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY

1402 E. CHURCH ST. • ADRIAN, MICHIGAN

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Collet Index Fixtures



Collet index fixtures, for tool room and production work, hold work accurately and provide a means for rapid and economical indexing. They are designed for direct application or for use with a sub-base on milling machines, grinders, shapers, and drill presses.

A preselector index plate is said to prevent the operator from making a mistake when indexing.

Hardinge Brothers, Inc., Elmira, N.Y.

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With heavy duty, rubber tired, ball bearing wheels and one piece fold-down handle, the Wells Model 49A is a metal cutting band saw that's REALLY MOBILE . . . and VERSATILE. Use the 49A as a horizontal cut-off machine (capacity 3½" x 6") or swing the head to vertical position . . . it's an upright band saw.

The optional wheel and handle unit, available for new machines and those already in service, is a tremendous time and labor saver. Ask your local Wells Distributor for details . . . or write for Bulletin 253-H.

Wells

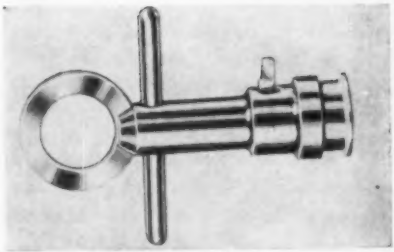
The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

707 Coolidge Ave., Three Rivers, Michigan

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Removes fuse adapters easily.

Tool Removes Fuse Adapters Readily

Fuse adapters can, when necessary, be easily removed. The Trico X-Tract-O removes type S fuse adapters without damaging the fuse block or the Edison base screw shell. It is built for long lasting service.

Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

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cut floor-to-floor time...
assure accuracy... with SP

POWER CHUCKS and ROTATING CYLINDERS



S-P POWER CHUCKS. Self-centering or compensating. American Standard or serrated. 2 or 3 jaws. Sizes, 6 to 18 in.

Famous S-P cam and lever design

- grips work tighter, resists jaw opening under load
- longer jaw travel, balanced for high rpm.
- flame hardened master jaw ways

installed as original equipment by leading manufacturers

S-P ROTATING CYLINDERS. Sizes; 3 to 16 in. bore (air), 3 to 8 in. bore (hydraulic, 500 psi).

Air and hydraulic

- weight-saving design, long stroke, compact inlet
- balanced for high rpm, American Standard mountings, finished adapters available



Representatives in principal cities. Phone or write for Catalog No. 112

SP *for speed and performance* THE S-P MANUFACTURING CORPORATION SOLON, OHIO

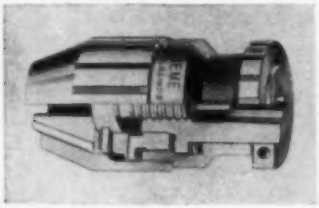
NON-ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • VALVES, ACCESSORIES

A Bassett Company • In Greater Cleveland • Established 1917

AA-7483

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Keyless Industrial Chuck



Keyless industrial chuck.

A keyless industrial chuck, called the Precisionist, is intended for use wherever close tolerances are a must. It is made of chrome molybdenum alloy steels and high quality hardened steels.

The ball bearing construction is said to make for a 100% sure grip on cutting tools, yet allow the chuck to be opened easily with the fingers.





Taft-Peirce Air Capsules measure only 1½" long overall x .375" diameter. The Plain Body Type shown above clamps easily on standard shop measuring tools, or may be built into special gaging fixtures.



The Threaded Body Air Capsule features extra fine pitch body threads for applications where the Capsule must be critically positioned or moved slightly along its axis at frequent intervals.

NEW Air Capsule Provides Low Cost Accuracy for Gaging and Quality Control

From toolroom to transfer line, this new Taft-Peirce Air Capsule creates exciting new opportunities to apply high magnification, visual gaging to all kinds of close tolerance inspection work.

Clamp the Capsule on height gage or surface gage for precise work checking on a surface plate. Substitute it for dial indicators or micrometer heads when designing gaging fixtures. Take advantage of its long-wearing carbide contact point by using it as a sensing device for continuous process inspection.

A Taft-Peirce Air Capsule operates with any CompAIRator Air Gage at any standard magnification, allowing you to spread a few thousandths of an inch over a wide dial expanse, with each graduation equal to a tenth or finer. Available in short range models (0 — .004"), and long range models (.004" — .040"), with plain or threaded bodies. Write today for more information.

TAKE IT TO TAFT-PEIRCE

TAFT-PEIRCE MANUFACTURING COMPANY • WOONSOCKET, R. I.

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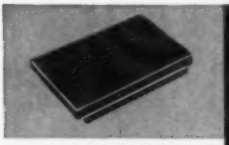
The chuck is available now in ½" capacity in tapers No. 2, 6 and 33, and in ⅝" capacity with No. 6 taper. Soon to be released are the ¼" and ⅜" capacity chucks of a similar ball bearing construction.

Supreme Products Corp., 2222 S. Calumet Ave., Chicago 16, Ill.

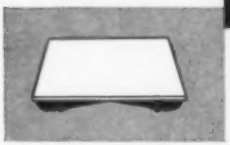
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Press Feed Arrangement Hitch-Feeds 2500″ Per Min.

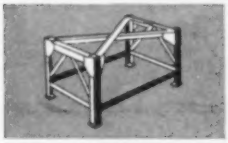
A mechanism called the Flexofeed is used in conjunction with a standard high speed Flexopress (cap. from 30 tons to 300 tons), which uses conventional dies. The mechanism is actuated by mechanical linkage driven directly from the press. Changeover from one part run to another can be accomplished quickly since dies are accessible.



Black Granite Plates



Cast Iron Plates



Stands



Layout Plates

FOR ACCURACY
YOU CAN DEPEND ON . . .
MACHINE PRODUCTS
PLATES and ACCESSORIES

Surface Plates — most complete line offered anywhere. Sizes to meet every need, your choice of material . . . super-smooth, wear-resistant black granite or rugged, precision-surfaced cast iron.

Stands — available in sizes for all Machine Products surface plates in two styles . . . as shown, or pedestal type for larger, heavy duty plates.

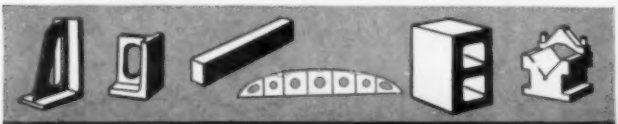
Layout Plates—designed for layout, inspection or machining operations. Standard sizes available for immediate shipment . . . special sizes on request.

No need for another source for measuring accessories, either, because Machine Products can supply angle plates, vee blocks, parallels . . . whatever you need. Send for your free catalog today.

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LEVERS • WHEELS



Available from stock in styles and sizes to meet most every need. Also, "specials" in sizes and materials to your specifications.



MACHINE PRODUCTS CORPORATION
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FREE CATALOG

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The press feed arrangement hitch-feeds material at 2200″ to 2500″ per minute (over two miles of material per hour), with accuracy to ±.002″. The arrangement makes for high speed stamping of parts with long as well as short feed increments, from coil stock.

Precision Welder & Flexopress Corp., 3520 Ibsen, Cincinnati, Ohio.

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Unit permits high speed stamping of parts with quick changeover.



Blue Devil **DOWEL PINS**

BLUE DEVIL DOWEL PINS and Socket Screw Products feature the same high standards of quality, design and strength. Always insist on Blue Devil . . . you'll be glad you did!

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Automatic Millers For Slicing Crystals

The Model 8SA special automatic miller (illustrated) is set up for the plunge-cut slicing of Germanium into .013" thick wafers, ±.0005". Cutting is done by a diamond impregnated cutting disc, 5" diameter by .015" thick, rotating at approximately 7000 rpm. The vertically held workpiece is plunged into the cutting disc continuously to proper depth, with automatic adjustable table cross feed synchronized with continuous table reciprocation. Table feed is air-actuated, and quickly variable from 0 to 60" per minute. Automatic cross feed is adjustable in increments of .001".

The Robert E. Morris Co., West Hartford 7, Conn.

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• For a "quick picture" of the Plus Values to be found in the complete NOPAK line . . . Air Cylinders, Hydraulic Cylinders, Air and Hydraulic Valves, Speed Control Valves and the new Nopakmatic poppet-type air control valves . . . get a copy of Bulletin SW-3. This concise, condensed, catalog belongs in your files. Ask your NOPAK representative or write for your copy of Bulletin SW-3.

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GALLAND-HENNING NOPAK DIVISION

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LOWEST PRICES
Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

Carat	Price
1/4—	$ 2.25
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1 1/2—	12.00
2 —	16.00

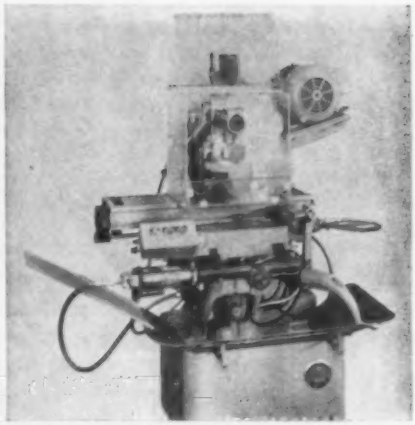


★ These diamonds can be set in any shank to your specification for $1.00 each extra.

★ Prompt resetting service

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Manufacturers of a complete line of diamond tools and wheels
245 W. 27th St. New York 1, N.Y.
CH 4-7725
★ Dealers' inquiries invited

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Model 8SA has 14" adjustable cutting stroke.

Miniature Latching Relay

A 6PDT miniature latching relay is said to remain operative under 30g shocks and 10g vibration at 55 cps. The KE relay requires only a 1.5 watt pulse

eliminate GLAZE slowdowns with CERAMET
REG. TRADE MARK



BONDED DIAMOND WHEELS

Clipper's new and unique ceramic-vitreous bond provides longer life with less dressing. Holds the high, sharp free-cutting particles firmly, but also "knows when to let go." Does not fill or glaze, but always presents a fresh, sharp grinding surface to the work. Reduces costs.

Get Your Copy! *New Clipper Catalog DW58 sent on request. Let us have your grinding problems and requirements.*

Clipper Diamond Tool Co.

345 HUDSON STREET, NEW YORK 14, N. Y. • CHelsea 2-7143

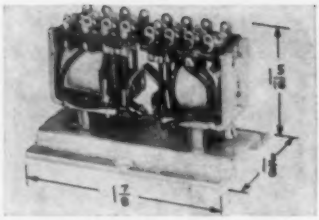
Use postpaid card. Circle No. 369

for 10 milliseconds to transfer the contacts. It is designed for intermittent duty.

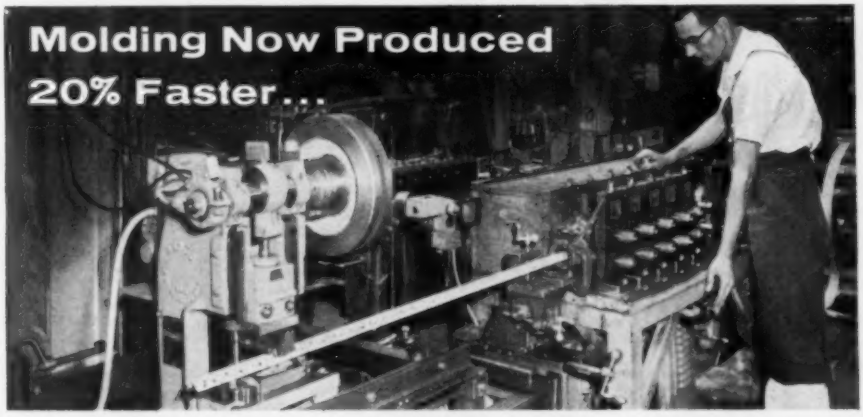
The contacts are rated at 2 amps, 115 volts, 60 cycles for resistive loads. The DC relay operates on voltages up to 48 volts. It can be furnished open or hermetically sealed.

Potter & Brumfield, Inc., Princeton, Ind.

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Operates under 30g shocks and 10g vibration.



with KENCO 5-TON PUNCH PRESSES

Steel molding is now made 20% faster with one operator from coil in one automatic operation, utilizing two Kenco 5-ton presses at Universal Molding Company, Lynwood, California. The first Kenco is fed continuously from a roll feed and operates at 500 strokes per minute to punch a standard hole pattern. Rollers then form the material into an angular molding which is cut off automatically (burr free) to lengths of 8′ ± 1/16″ in a Kenco 5-Ton Punch Press. Formerly the strips were sawed which left objectionable burrs on the ends. In 1½ years of operation of 1 and 2 shifts per day the Kencos had a *minimum of maintenance.*

Kenco Presses are precision built for maximum production—They weigh up to 30% more, permit up to 100% overloading, have solid crank shafts free from weakening slots, a driving dog that strikes a hardened and ground plate, and many other exclusive features that keep them on the job.

You too can increase production with Kenco Presses—and at the same time increase profit. Can we give you additional information?



2 Ton | 5 Ton | 8 Ton | 15 Ton | Electro-Safe | Slow Speeds | Deep Throat | Specials

Job Facts:

Company: Universal Molding Company, Lynwood, California • Machines: Two Kenco 5-Ton Punch Presses • Job: Making steel molding from coil • Accuracy: Cut-off 8′ ± 1/16″, Burr Free • Former Method: Sawing which Burred Ends • Shifts: 1 & 2 per day, for 1½ years • Maintenance: Very little • Savings: 20% Faster

Write for literature covering 2, 5, 8 and 15 ton Standard and Deep-Throated Kenco Presses.



KENCO MANUFACTURING CO.

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free!

NEW 1958 CATALOG

MONTGOMERY TOOLS

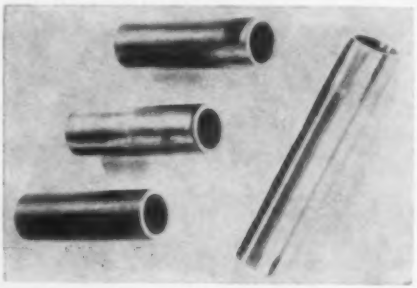
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403 Morris Ave. Springfield, N.J.
DRexel 6-4767
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Rust Preventive Works Best With Wax Base

Illustrated are the protective properties on coated carbon steel tubing of the microcrystalline wax base rust preventive with inhibitor added. The sample at right, coated with the material, shows no signs of rust after six weeks' exposure to fumes. The rusted



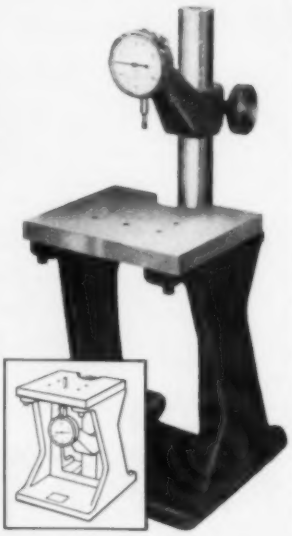
Wax-based rust preventive at work.

VERSATILE

SMALL SHOP GAGE

Check thicknesses, depths, diameters, counterbores, shoulders, etc. with one dependable gage.

Use the Acra-Ment BC-500 in column-up position (see photo) for O.D.'s etc. to 5"; in column-below position, indicator contact comes up through platen for checking shoulders, etc. to 4". Send for details.



ACRA-MENT

The Measure of Quality

ACRA-MENT INSTRUMENT DIVISION
SEALOL CORP.
2110 Post Road Providence 5, R. I.

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sample at left below was uncoated, and the two at left above were coated with ordinary rust preventives.

In addition to giving long-lasting protection, the preventive is also non-staining and non-irritating.

Superior Tube Co., Norristown, Pa.

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New Improved Micrometer

The manufacturer announces the availability of his new improved spacing collars which are said to allow very accurate adjustment of the spacing of the cutters. When necessary to sharpen and grind the cutters, the collar very readily compensates for the variation in side milling cutter sharpening.

NEW AIR FILTER

Drains itself bone dry!



NO HAND DRAINING

Extracts and vaporizes all air line moisture and grit, prevents costly rust and abrasion of valuable tools. Combines with pressure regulator and automatic lubricator for complete protection of air-operated equipment.

Write for full information today!

(See Thomas Register for nearest distributor's address, phone number.)

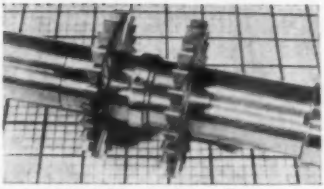


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SPECIALTIES COMPANY

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PATHFINDER IN AIR POWER AUTOMATION

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Micrometer adjustable spacing collar.

The micrometer adjustable spacing collars, for milling machine cutter arbors, are calibrated in thousandths. Smaller dimensions are said to be accurately calibrated.

Dayton Rogers Mfg. Co., Minneapolis 7, Minn.

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Now! MARK

FLAT, ROUND, CONTOURED SURFACES *at* HIGH SPEEDS!

MARKS ANY SHAPE



WITH

Automark

(MODEL HRMA)

ROLL MARKING MACHINE

Here is speed, versatility and adaptability in a Marking Machine that operates by air pressure and that is controlled electrically. Marks any shape material... round, flat or contoured.

CUTS PRODUCTION COSTS... GREATLY INCREASES OUTPUT

The Automark operates at speeds up to 6,000 or more 1-inch strokes per hour, or 1,400 strokes per hour on stroke of ram and die slide combination. Think of all the saving in time and money with Automarks in your shop!

AUTOMATIC FEEDS *and* FIXTURES MAY BE SUPPLIED...

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DEFIANCE MACHINE & TOOL CO.

1922 S. VANDEVENTER Dept. MT ST. LOUIS 10, MO.

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New Line of Carbon Vanadium Punches

The addition of a complete line of low-cost, carbon vanadium punches made to precision standards are reported to offer a concentricity tolerance of .0002 T.I.R. between point and shank. Prices listed are generally 20% to 65% lower than former prices in high speed steel punches, according to the announcement.

There is a wide selection of square, oval and rectangular points for standard shanks, as well as a good selection of shank sizes, point sizes and overall lengths in both shoulder type and interchangeable ball seat type punches.



Carbon vanadium punches.

Punch Division, Pivot Punch and Die Corp., North Tonawanda, N.Y.

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SAVE TIME and MONEY

101 REPAIRS

Lab-metal

3 lbs. 3.95

Spreads like paste—Hardens to metal

Metal - Wood - Plaster - Glass - Plastic

EASY! FAST! NO MIXING!

Available at your distributor or write

ALVIN PRODUCTS, Inc. Worcester 4, Mass.

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This

THRIFTMASTER

Fixed Center

DRILLHEAD

does 27 jobs

in 1 fast operation!

Get *maximum* production—use Thriftmaster designed and built Fixed Center Drillheads . . .

- Full ball bearing construction
- Fully hardened chrome-moly steel gears, spindles and drives
- All sizes, any number of spindles
- All types, including angular, rotating and lead screw
- For drilling, tapping, reaming, boring and milling
- Guaranteed performance backed by over 25 years of engineering and production experience

Also Full Ball Bearing Universal Joint, Single and Double Eccentric Adjustable Drillheads and Dorman Tappers.

Write, wire or phone for complete information today.

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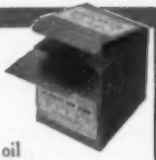
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DE-STA-CO

ARBOR SPACERS
SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.



FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)



SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001 to .032".

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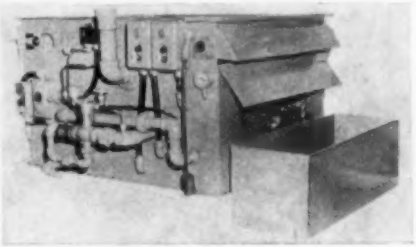


DETROIT STAMPING CO.
347 MIDLAND AVE. • DETROIT 3, MICH.

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Compact Filter and Conveyor

A combination filter and drag-out conveyor type of filter features a continuous or intermittent clean coolant automatic back-wash. Filtering medium consists of tubular screen rotating at the same speed of the conveyor system. The manufacturer has designed a



unit to take up as little floor space as possible.

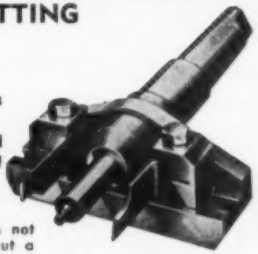
Lundholm Manufacturing Co., 1121 Charles St., Rockford, Ill.

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For Holes & Cores in Less Time

USE THE RIGID BOREMASTER FREE CUTTING

Five sizes available for holes or cores from 1½" to 11¾" and to a depth of 8".



BOREMASTER is not a Fly Cutter, but a Heavy Duty Trepanning Tool with retractable Pilot. Two blades cut simultaneously—a lead blade and finishing blade—giving good stability and chip load distribution. Stock is removed in one piece.

SAVED TIME AND MATERIAL MEAN MORE *PROFITS* FOR YOU

Also available without pilot for turret lathes

Sole USA Representatives:

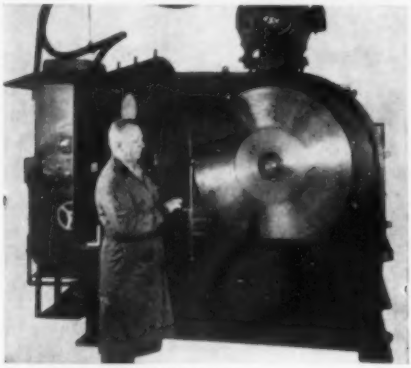
NEISE MODERN TOOLS
KARL A. NEISE
404 4th Ave., Dept. MT
New York 16, N.Y.

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Friction Saw Has Built-In Cooling System



Pit not needed for this saw.

The friction saw features a new electronic feed replacing the old hydraulic system, and a coolant system assuring cool-edge, dry-blade cutting. The saw's one-piece construction permits semi-portable use, and eliminates



DON'T LET THIS HAPPEN
End Oily Floors with
DRY-IT
Reduce Accidents and Costly Time-Offs
No Fire Hazard!
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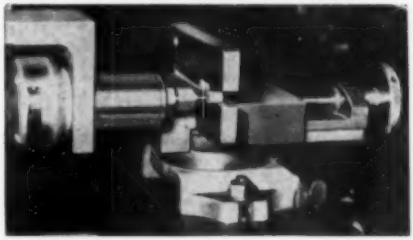
building a pit. The new coolant system is reported to reduce changing time by over 50% while prolonging blade life.

The saw's electronic variable torque feed eliminates the need for hydraulic oil lines, pumps and storage tanks.

Ty-Sa-Man Machine Co., Inc., 800 White Ave., Knoxville, Tenn.

Use postpaid card. Circle No. 124

Left Hand Rotation On Air Turbine Grinder



WILSON "ROCKWELL"

THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

A Complete Library of Helpful Information on Hardness Testing





No matter what hardness testing requirements you have, there's a WILSON instrument to do the job for you. WILSON's library of hardness testing information has data on applications—the principles of the "ROCKWELL" tester—operation—accessories—conversion tables—the full line of WILSON instruments.

Write for complete details on specific machines. Just check the bulletins of particular interest to you.

☐ **DH-325**—WILSON "ROCKWELL" Hardness Testers, for *most* hardness testing requirements.

☐ **DH-326**—"ROCKWELL" Superficial Hardness Testers, for extremely shallow indentations.

☐ **DH-327**—Special "ROCKWELL" Testers, for unusual applications, including Automatic and Semi-Automatic models.

☐ **DH-328**—TUKON Tester, for precision MICRO and MACRO testing.

☐ **TT-58**—Twintester, which combines functions of "ROCKWELL" and Superficial Testers.

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ADDRESS_____

CITY_____ STATE_____

ACCO

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-T Park Avenue, New York 17, N.Y.

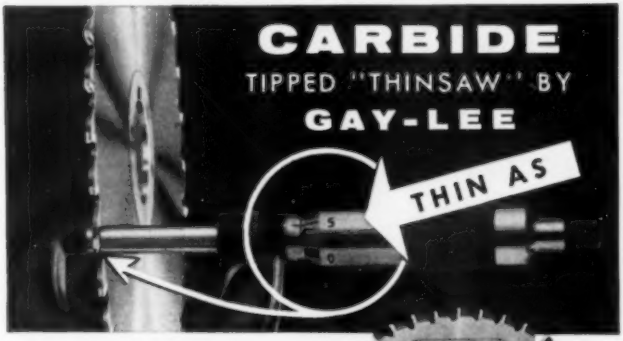
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The DIA-LH air turbine grinder is available with left hand rotation for mounting on milling machines or machine grinders. Any standard dust collection set-up may be used with the tool. Typical applications include slot and depth grinding, tool chip breaker grinding and cutter sharpening.

The grinder operates at 50,000 rpm at the low air consumption rate of only 8 cfm. Its ¼ hp is ample for any work resistance with grinding wheels up to ½" diameter. It is pre-loaded to control end play to a 0.0002" tolerance.

Onsrud Machine Works, Inc., Portable Tool Division, 7758 Lehigh Ave., Niles 31, Ill.

Use postpaid card. Circle No. 125



Ideal for precision, high-production sawing, slitting, slotting! Exclusive Gay-Lee design features long-wearing carbide tips brazed into a circular seat which provides more brazing area, greater mechanical strength and maximum tip security. (Patented, U. S. Pat. No. 2675603, manufactured under license.)



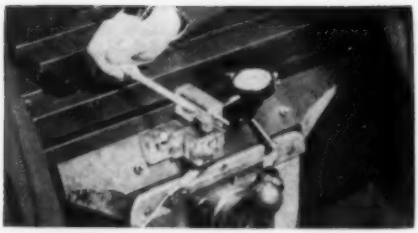
- Thicknesses low as .030"
- Thickness tolerance can be held to .0001"
- Wafer-thin for the most delicate work
- Maintain positive alignment and rigidity
- Cut to full depth without runout
- O. D. from 1½" to 10"
- Available in any carbide grade
- Made to any tooth form

CARBIDE SAW SPECIALISTS

GAY-LEE COMPANY
CLAWSON • MICHIGAN

Write for free literature, send us details of your problem.

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Controlled ball activity in magnetic cavity produces electrical switching in a revolutionary type of control component.

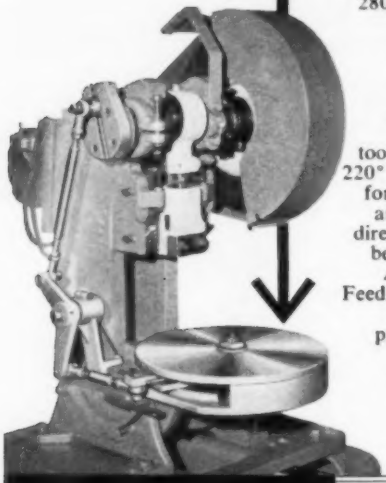
Electrical Control Concept

The electrical control concept is incorporated in a magnetic electrical cavity, which will form the nucleus of components acting as relays, limit switches, proximity switches, motor starters, and variable resistance power control units with practically infinite life.

Control action in the magnetic electrical cavity occurs through activity of balls within the magnetic cavity.

Make Your Press Almost Automatic!

The new benchmaster Dial Index Feed



FOR PUNCHING, RIVETING, STAKING, ASSEMBLING!

Now you can get a finished part or perform an assembly operation with every revolution of the punch press flywheel... with extreme operator safety and at strokes up to 280 per minute! Choice of 12" or 15" tables, 10 or 12 stations.

LOW HEIGHT—only 2⅜" overall... allows greater use of press shut height, more space for tooling! Repeats accurately, 220° dwell between indexing for ample tool engagement and withdrawal. Attaches directly to bolster area. Can be used with Benchmaster Automatic Friction Roll Feed. All wearing parts heat-treated. Special dropoff provided for in mounting base. Fits Benchmaster presses and most others.



benchmaster

World's largest manufacturer of small punch presses and mills.

1835 W. Rosecrans Avenue • Gardena, California

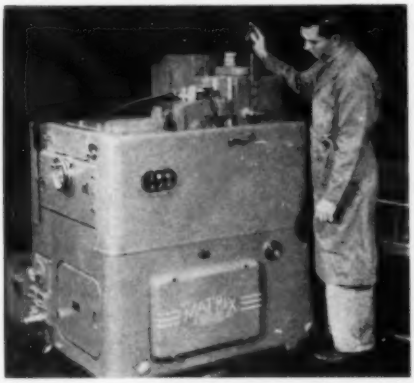
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The magnetic ball devices do not have any mechanical moving parts, and thus mechanical failures are eliminated. Large load carrying capacity with minute control energy or input signals are also advantages.

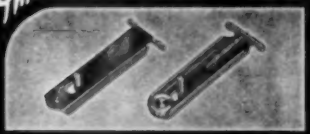
Tann Corp., Detroit, Mich.

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Fine Pitch Gear Grinder



Amcor Roller Stock Pushers



FOR POSITIVE STOCK ALIGNMENT

5 IMPORTANT ADVANTAGES

LOW COST — costs only a fraction of hand-made pushers
SIMPLICITY OF INSTALLATION — requires milling of one slot and drilling of one hole
COMPACT — engineered and manufactured for minimum space requirements
ANTI-FRICTION — hardened roller on brass shaft requires minimum effort to insert and feed stock
MINIMUM DIE MAINTENANCE — no refitting necessary when die is sharpened . . . increases pilot life

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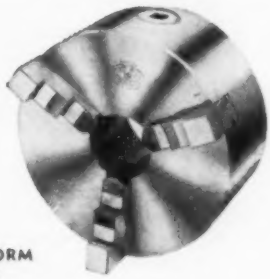
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528 Fourth St., N.W., Grand Rapids, Mich.
Telephone GLendale 9-8544

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FLAME HARDENED JAW WAYS
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COMPLETE WITH 2 SETS OF JAWS AND CHUCK WRENCH

Size	Weight	Dia. of bore	Price*
3½"	6 lbs.	5/8"	$34.00
4½"	6 lbs.	1-1/8"	34.00
5½"	11 lbs.	1-1/2"	40.00
6½"	16 lbs.	1-11/16"	46.50
7½"	26 lbs.	2-1/4"	55.00
9"	38 lbs.	2-3/4"	70.00
10½"	68 lbs.	3-1/2"	86.00
12"	106 lbs.	3-7/8"	115.00

*Prices f.o.b. warehouse, N.Y.C.
Back plates available at extra cost.

These are superior chucks produced by an English manufacturer famous for precision built machine tools and represent unbeatable values. A certificate is supplied with every chuck attesting to and guaranteeing its accuracy. All parts are guaranteed for a year against defective workmanship and materials. Repair parts available.

In stock for immediate delivery!

Manhattan Supply Company
151-A Grand Street, New York 13, N. Y.
Telephone CAnal 6-4992

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The Matrix No. 61 fine pitch gear grinder has grinding wheel, similar to a large diameter hob, or worm, which has the basic rack form incorporated into its periphery by the Crushtrue process. The machine is of the full generating, continuous indexing type for fast production.

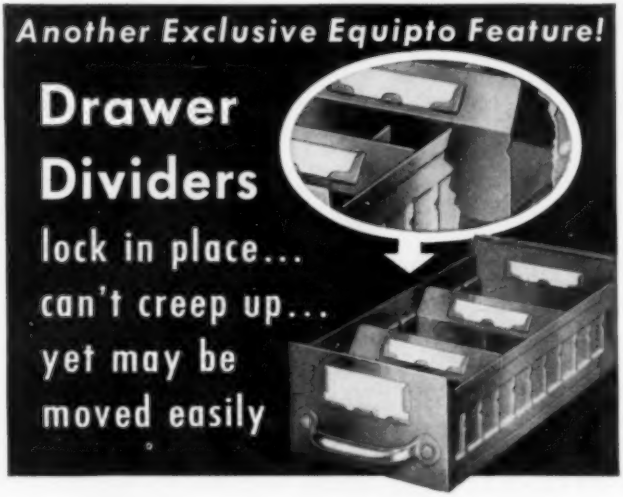
The machine grinds spur gears, which is in line with general fine pitch requirements.

"Crushstone" rolls as fine as 200 D.P. are produced, and the form transferred to the grinding wheel used to generate the fine pitch gears, according to the announcement.

Specs. include: Max. pitch, 16 D.P., min. pitch, 200 D.P.; max dia. of work, 6", min. dia. of work, 0"; feed per revolution of work, .001" to .012".

The Sheffield Corp., Dayton 1, Ohio.

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Equipto drawers are of one piece construction — front, bottom, back, with all welded sides. Embossed runners on bottom allow drawer to slide easily. Adjustable dividers lock in place — an exclusive feature found only in Equipto Drawer Units. Tops of dividers are slanted back and have new type instantly visible label holders . . .

Equipto Drawer Units are available in all sizes and combinations to suit your individual storage needs. Interested? Why not find out more by writing for complete Drawer manual No. 206.

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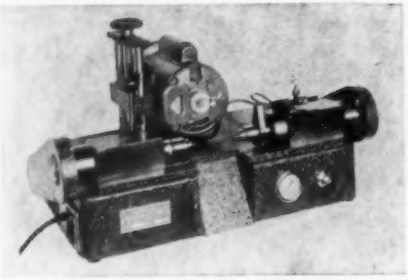
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Bench Deburring Machine

Deburring both sides of holes from 1/32" to 1/2" diameter is claimed possible on the opposed spindle bench machine.

Spindles rotate in opposite directions, which is said to eliminate cutter torque and make hand feeding both safe and easy. Operator fatigue is minimized as the machine is foot controlled and the spindle is air operated.

Model Machine Co., Inc., 4729 Hawthorne St., Phila. 24, Pa.



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Fluorescent Lighting Helps the DAZOR FLOATING MAGNIFIER

Step Up Accuracy and Speed

In Toolmaking • Diemaking • Machining • Assembly
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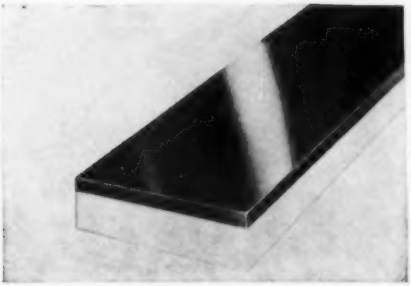


Sharp, 3-diopter magnification has a big extra in this Dazor—built-in, directed lighting from three T5 6-watt fluorescent tubes. Double-convex lens, 5" in diameter, stays exactly where placed by user for fast, comfortable seeing. Universal model shown. Same *Floating-Arm* convenience in popular Desk and Pedestal models. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10, Mo.

. . . Makers of

DAZOR FLOATING LAMPS

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Aluminum bronze clad wear plates.

Clad Wear Plates Now Have ¼" Thick Aluminum Bronze

The thickness of aluminum bronze on their clad wear plates has been increased from 3/16" to ¼" by the manufacturer, thereby increasing the extra long wearing properties.

The wear plates are available in 14 standard cross sections from ½" to 1¼" thickness, 1½" to 8" width, and up to 72" long.



Six machines protected from dust by Torit for **$666.15**

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just $666.15!

After one year's operation, Mohr Lino Saw says this about their *low-cost* Torit installation: "The Torit installation has kept our shop *cleaner*, our operators *happy*, and *protected vital* machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust *at its source* with a completely *self contained* and *portable* Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.
Dept. 603, 311 Walnut Street, St. Paul 2, Minn.

Use postpaid card. Circle No. 389

The Ohio Knife Co., Dept. D-80, Cincinnati 23, Ohio.

Use postpaid card. Circle No. 129

New Method to Measure Toughness to Tool Steels

Crucible Steel Co. of America announced it has developed a more effective way to measure and rate toughness of tool steels, in an effort to meet the need for a single standardized procedure of rating toughness of tool steels heat-treated to high hardness.

The testing method involves a change in the preparation of the specimens tested rather than a change in testing apparatus. By abandoning the standard V-notch on the specimens and replacing it with a cylindrical notch of 0.5" radius, a greater spread in impact value was obtained for different hardened tool steels in the conventional Charpy impact tests, according to the announcement.

Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 22, Pa.

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suspension type

FLEXIBLE SHAFT MACHINE

eliminates tooling problem for I.B.M.



International Business Machines Corporation had the problem of reaming holes .813" in diameter in the mounting hanger on the main base of their 407 Accounting Machine. To eliminate expensive tooling for this operation, they selected a STOW V50 portable flexible shaft machine, which was specially fitted with an on-off switch mounted on the handpiece.

The V50 machine delivers 1150, 2100, 3450, or 5750 RPM, is furnished with a 6 foot flexible shaft. Other speeds can be achieved by using different size pulleys (I.B.M. ran the reamer at 750 RPM.) Available in either ¾, 1, 1½ or 3 HP, the V50 can be used for grinding, buffing, sanding, wire brushing and drilling.

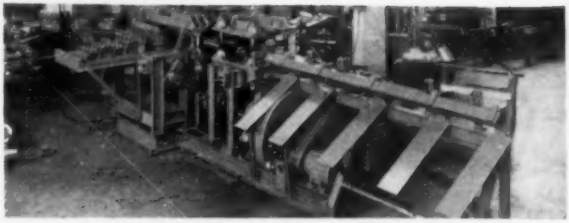
STOW MANUFACTURING CO.

30 Shear Street **Binghamton, New York**

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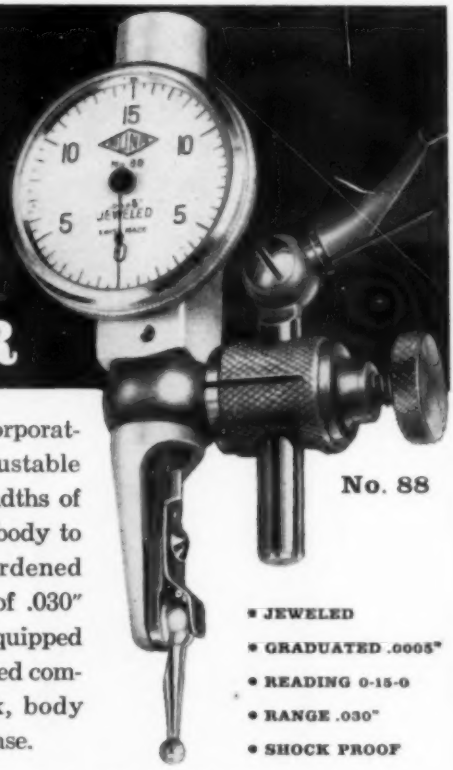
Automatic High-Speed Welding

Wire bolsters are produced automatically at the rate of 5000′ per hour on an automatic welding and forming machine, built for a leading steel mill. Formerly the average bolster rate was 1550′ per hour. The manufacturer points out that produc-



Wire bolsters are produced 5000′ per hour—formerly 1550′ per hour.

ALINA DIAL TEST INDICATOR



A fully reversible indicator incorporating a clear easy-to-read, adjustable dial, graduated in half thousandths of an inch, a switch lever on the body to reverse action and TWO hardened chrome plated contact points of .030″ and .100″ diameter that are equipped with a non-slip ratchet. Furnished complete with a universal shank, body clamp, and plush lined steel case.

No. 88

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- GRADUATED .0005"
- READING 0-15-0
- RANGE .030"
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ALINA CORPORATION

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210	235	260	285	310	335	360	385	410	435	460	485	510	535	560	585
211	236	261	286	311	336	361	386	411	436	461	486	511	536	561	586
212	237	262	287	312	337	362	387	412	437	462	487	512	537	562	587
213	238	263	288	313	338	363	388	413	438	463	488	513	538	563	588
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218	243	268	293	318	343	368	393	418	443	468	493	518	543	568	593
219	244	269	294	319	344	369	394	419	444	469	494	519	544	569	594
220	245	270	295	320	345	370	395	420	445	470	495	520	545	570	595
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tion economies can be realized by integrating forming and welding into a single machine or production line, and the equipment can be designed to accommodate a variety of types and sizes of parts.

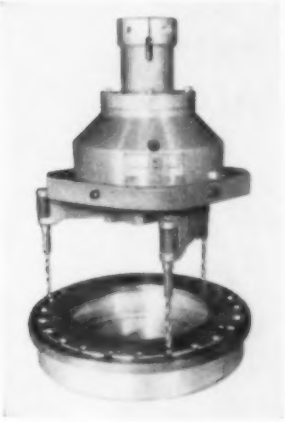
Two types of bolsters, made of No. 4, No. 5 and No. 7 wire (used to support reinforcing rods in concrete construction), are produced on this machine.

Precision Welder and Flexopress Corp., 3520 Ibsen Ave., Cincinnati 30, Ohio.

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Tap-Cut 25, a chemically-active, organic compound is said to perform a dual cutting fluid role, speeding metal removal in production tapping, plan-



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ing, shaping and milling operations, while retarding tool wear. Low tapping speeds, usually 15 to 20 sfm, with heavy feeds develop high energies released in the form of heat, causing the stock to plasticize against the cutting face.

United Laboratories, Inc., Huntington, Indiana.

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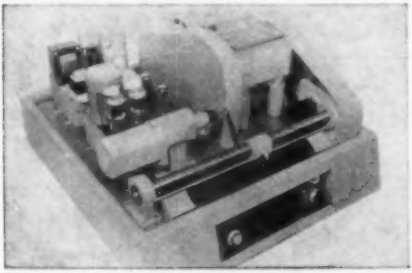
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The system may be used in conjunction with computors or with signal sources sensing linear motion or distance, pressure, temperature, flow and speed as well as with manual controls. Components include a signal comparator (electrical or mechanical), a power supply converter, the electronic amplifier, mechanical power amplifier.



Electro-Mechanical Controls—(Right) mechanical power amplifier, (lower left) displacement transducer, and (upper left) electronic amplifier.

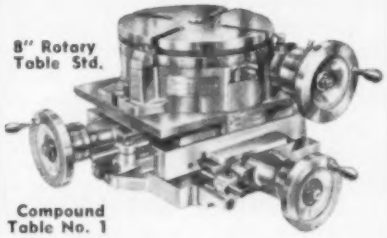
Seneca Falls Machine Co., Electronics Div., 12 Fyfe Bldg., Seneca Falls, N.Y.

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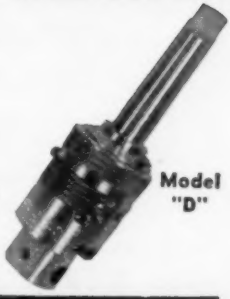


THINK of it!

NOW you can have a boring head that will **BORE, FACE, TURN** and **GROOVE** at no higher cost than you would pay for an ordinary, single purpose boring head.

A Boring Head That Won't Face is NOT Complete

THINK this over before buying that new head!



Models for Any Size Machine

Write today for full details

CHANDLER TOOL COMPANY
MUNCIE, INDIANA

COMBINED BORING & FACING TOOL HEADS

Chandler-Duplex

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Tape Control For Standard Machine Tools

The F series, tape duplimatic controls, the Factrol Analog System, is a continuous path magnetic tape system for controlling motions and auxiliary functions of machine tools and other motion control processes. The manufacturer offers a complete service, the controls, servomechanism equipment, brackets to mount and supervision of installation on present machine tools, or as a packaged control unit for machine tool builders.

A recorder is offered along with the system, for transferring the tool path from a part drawing onto magnetic tape.

Makes precision internal gaging easy



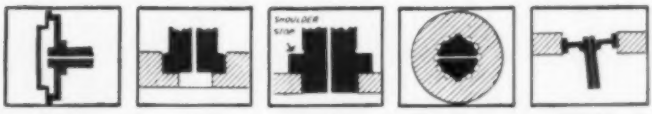
COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8″ to 10″ dia.

Investigate the gage used by thousands in jet propulsion, automotive transmission, household appliance and other volume-precision industries.

Just say "BULLETIN 50"

Comtor Co., 62 Farwell St., Waltham 54, Mass.

ALSO easily adaptable to SPECIAL PROBLEMS!



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NOW . . . SET UP COMPOUND ANGLES INSTANTLY

Save time and money with this Master Multi-Swivel Vise. And you can often save the cost of an expensive jig or fixture! Investigate the money and time saving possibilities by writing today for free illustrated folder.

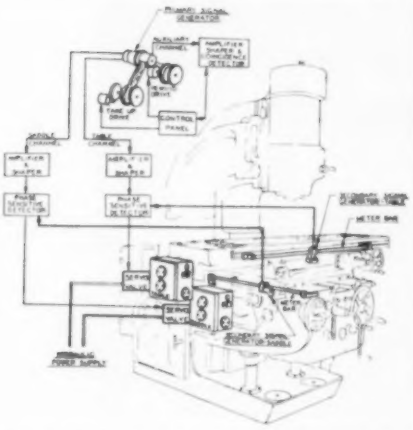
DONOVAN MFG. CO.

60 Batterymarch St. Boston 10, Mass.



Representatives Wanted

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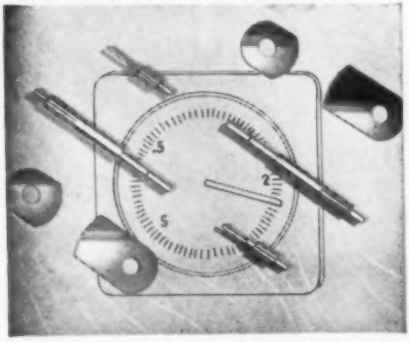
How to machine a part with the F series controlled machine tool.

Tracer Control Co., 595 E. Ten Mile Rd., Hazel Park, Mich.

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20 TO 200 D.P.

SEND YOUR PRINTS FOR QUOTATION



SPURS • HELICALS • WORM AND WORM GEARS
STRAIGHT BEVELS • LEAD SCREWS • RATCHETS
CLUSTER GEARS • RACKS • INTERNALS • ODD SHAPES

THE *Finest* IN GEARS

Beaver Gear Works Inc.

1033 PARMELE ST. ROCKFORD, ILLINOIS

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

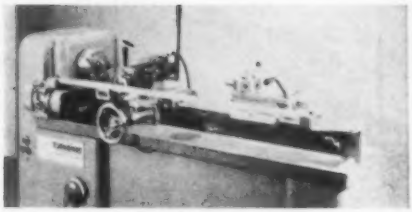


IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

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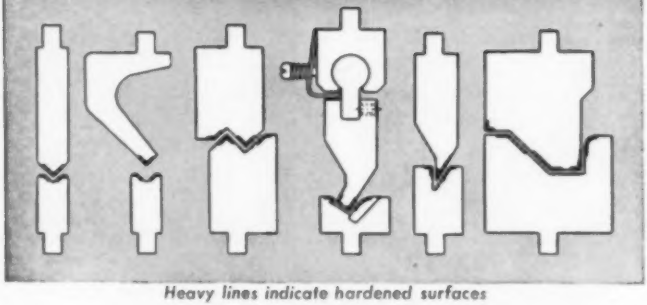


Spindle collet and cutting tool move as unit along bar stock.

All Operations of Turning Machine With Same Cutting Tool

Turnomat's turning operation is accomplished without the support of headstock and tailstock centers or steady rests, as the spindle collet and single point tool move along the bar stock as a unit. It has the ability to automatically produce work pieces of infinite lengths, tapers and contours

CHICAGO INDUCTION HARDENED PRESS BRAKE DIES



Heavy lines indicate hardened surfaces

for greater die life—

at no extra cost—

on any make press brake

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO induction-hardened dies for your next press brake job.

Steel Bending Brakes For Over Fifty Years 4901

DREIS & KRUMP MANUFACTURING COMPANY
7440 South Loomis Boulevard, Chicago 36, Ill.
CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

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with fine machine finish, to within a tolerance of .0005" or better.

The automatic centerless turning machine is designed for fast, one pass, one plunge cut turning of all types of metals, plastic, etc. All turning operations are done with the same single point cutting tool which eliminates set-up cost for cams, gears and multiple cutting tools, according to the announcement.

Taber Instrument Corporation, North Tonawanda, N.Y.

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Milling Machine May Be Equipped With 3 Spindles

The new U.S. Hy-Flex milling machine may be equipped with as many as three spindles positioned as required, and with any desired electrically controlled hydraulic table feed cycle. Features include two precision

M-B PNEUMATIC GRINDERS



Model M-CR-B



Model U-TR



Model HD-CR

Outstanding, powerful, fast-cutting tools of proven high efficiency. Designed for tough jobs and real production. Perform indefinitely and dependably. Precision made. Steel housing for safety. Also other models.

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M-B PRODUCTS
46 VICTOR AVE., Div. 22
DETROIT 3, MICHIGAN

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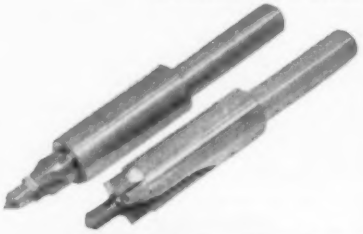


This unit has two precision spindles and was built to mill accurately located and dimensioned angle slots in an automotive part.

spindles bolted to a common slide, equipped with adjustable gib, Acme screw, and micrometer dial for accurate in-and-out adjustment. Idler pulleys permit changing the position of the spindles for the particular job.

PORTING TOOLS

Available from Stock



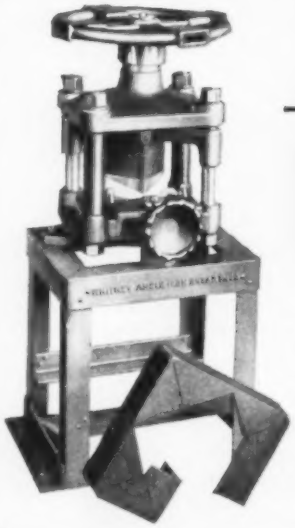
Combines 5 Operations In One
AND-10050—MS-33514—MS-35515

A complete line of combination ream, counterbore and facing tools to form AND-10050 standards. Tube size 2 thru 32 carried in stock. Also tools for MS-33514 and MS-35515 carried in stock sizes 2 thru 20. Special tools made to order.

WETMORE TOOL & ENGINEERING CO.

Engineers Designers Manufacturers
5318 E. Washington Blvd.
Los Angeles 22, Calif.
AN 9-7266

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FOR DOING WHAT COMES

NOTCH-ERLY

WHITNEY-JENSEN NO. 60
ANGLE IRON MITRE NOTCHER

CAPACITY—3" x 3" x ⅜" ANGLE IRON
COMPANION TO NO. 162 ANGLE IRON SHEAR
MOUNTED ON FLOOR STAND AS SHOWN
32" BAR HANDLE—SCREW PRESS ACTION

WHITNEY-METAL TOOL COMPANY
718 Forbes St., Rockford, Ill. *Since 1910*

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Flame hardened ways, one shot lubrication, JIC wiring and other special features can be readily added. Vertical slides as well as a horizontal slide and selective spindle speeds up to 12,000 rpm's are available.

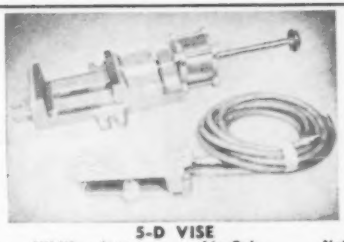
U.S. Burke Machine Tool Div., Brotherton Rd., Cincinnati 27, Ohio.

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Punch and Die Button Retainer Sets

The Inter-Mount retainer set, containing a master retainer and a reducing retainer, brings about a reduction of press down-time required for changing punches and die buttons. Any punch size or shape (having punch shank diameters from ½" to 2-¾") can be mounted in one Inter-Mount master retainer. The Inter-Mount die button retainer set holds die buttons having outside diameters from ½" to 3".

Complete interchangeability is reported as any master punch retainer will hold every size reducing punch



5-D VISE

Vise No.	Width Jaw In.	Jaws Open In.	Air Cyl. Jaw Depth	Air Cyl. Dia. In.	Wt. Lbs.	Net Resale Price
5-D	3½"	4"	1⅝"	2¾"	21 #	29.95
6-D	5"	5½"	1¼"	3½"	33 #	36.95

YOST AIR POWER VISES speed production and eliminate the wasted time of manual clamping. Built for the sole purpose of supplying a vise to eliminate the use of special and costly jigs and fixtures in the performance of drilling, milling, shaping and assembly operations.
A control kit is included with each unit consisting of a foot treadle valve, and two (2) lengths of coupled hose complete ready for use. These products maintain the Yost reputation for quality, endurance and convenience. The jaws may be preset to any desired opening.
The only way to appreciate a Yost Air Power Vise is to own one.

YOST MFG. CO.
124 Grant St.
Cambridge Springs, Penna., U.S.A.

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CUT . . . operating . . . maintenance . . . spoilage COSTS!

ON YOUR TAPPING JOBS!

Procunier tappers are the solution to steadily rising production costs on many tapping operations. They have the unique construction features that permit inexperienced operators to tap like experts. In addition, they provide many extra hours of continuous, **accurate** tapping without frequent "down-time" interruptions, producing more pieces with fewer rejections, less spoilage and a minimum of broken taps.

Check these advantages: New sensitive double cone friction clutch; soft cushioned action driving pressure; ball bearing equipped; heat treated gears; special balanced gear reversing mechanism, plus many others.

WRITE FOR FREE BROCHURE

giving full details on the complete line of Procunier Tapping Heads.



Exclusive "Tru-Grip" Tap Holder

smaller, lighter, more accurate, taps close to walls

PROCUNIER SAFETY CHUCK CO. 14 S. CLINTON STREET DEPT. 10, CHICAGO 6, ILL.

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SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish

Set #3-17, 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4⅞" ONLY $17.90
Single sizes available

R. L. SPELLMAN CO. - URBANA, OHIO

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Fisher Benders



A simple, sturdy machine designed to do its work in the easiest way, this bender is made of best quality malleable iron castings and has a hardened steel bending blade.

Capacity: 7/16" square or round iron
2" x ½" channel iron
2-¼" x 5/16" flat iron

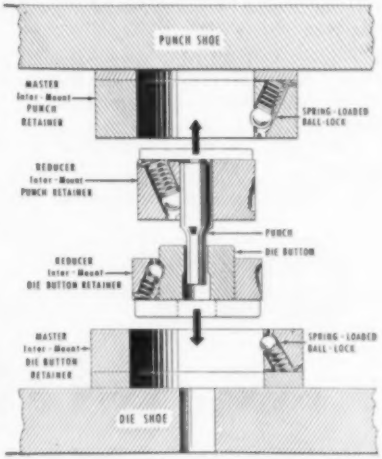
Catalog sheets on complete line available.

T. H. LEWTHWAITE MACHINE CO.

312 East 47th St. New York 17, N.Y.

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retainer and the same is true for die button Inter-Mount retainer sets.



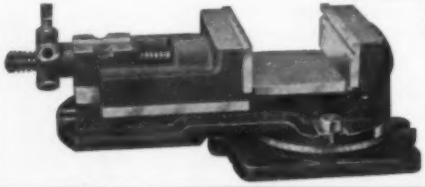
Richard Brothers Punch Division, Allied Products Corp., 26500 Capitol Ave., Detroit 39, Michigan.

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LOADED WITH FEATURES TO CUT PRODUCTION COSTS.

"GEM" Vises, "AIR Operated" **"GEM" Vises, "Screw Operated"**

Made in "8" convenient sizes to handle all machining applications with "SPEED" and "PRECISION."



Vise Shown—
Jaws 6¾" wide, 2½" deep, opens to 6¾"
Plain Vise $106.00 - Swivel Vise $137.00
"Air" Operated, plain $235.00
with Swivel $266.00

Your local distributor can supply you.

J. E. MARTIN MACHINE CO.
"Since 1912"
548 W. State Springfield, Ohio

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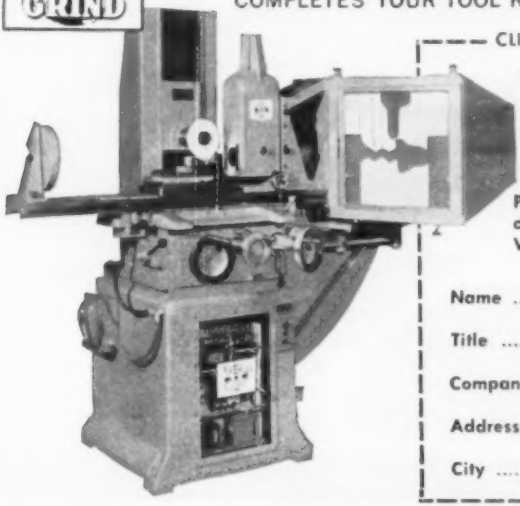
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FREE "VISUAL GRIND" BOOKLET SOLVES YOUR PROBLEMS:

IMPORTANT TO YOU. Free booklet tells how VISUAL GRIND facilitates contour grinding of carbide or steel, punch and die sections, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.



VISUAL GRIND



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Please send me the free brochure describing the capabilities of VISUAL GRIND.

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NAMEPLATE MARKING

Model No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS

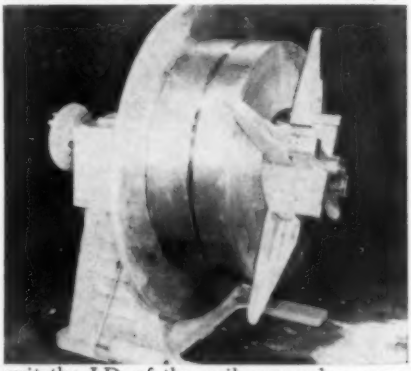
- Simple Operation
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1802 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

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Motor-Driven Centralizing Reel

The centralizing arrangement of Model ACR-1642 is controlled by a handwheel and the cross members, to



suit the I.D. of the coil, expand or contract depending on the direction or rotation of the wheel.

Specifications include: I.D. from 14½ to 22", O.D. 42" at 16" I.D., 2 hp motor.

CONCENTRIC LIVE CENTERS
the original, patented spring loaded live centers

JAM PROOF

GREATER LOAD CAPACITY

LESS OVERHANG MEANS MORE RIGIDITY... MORE WORKING RANGE

AUTOMATIC THRUST ADJUSTMENT
Spring loaded spindle maintains constant tail stock thrust.

LONGER LIFE
Needle bearing distributes bearing stress over greater surface, thus holding close tolerances for much longer time.

FASTER SPEEDS
Smaller turning radius gives much higher RPM rate than ordinary live centers.



Pat No. 2,520,473

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CONCENTRIC TOOL CORP., 2486 Huntington Dr., San Marino, Calif.

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U.S. Tool Co., Inc., Ampere (East Orange), N.J.

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How Much Do Your Coffee Breaks Cost?

Two minutes over, twice a day in a ten man shop, is $1,038.00 a year based on $6.00 per hour. The Versatimer eliminates this cost. It automatically signals the end of the coffee break. This device is completely self-contained and movable.

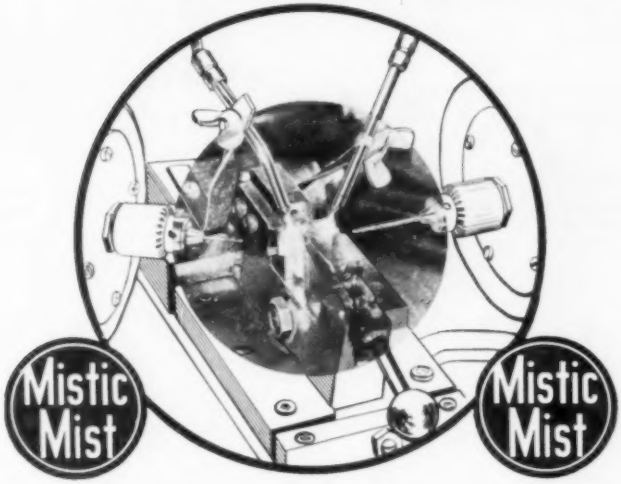
Just push a button at the start of the break, a buzzer rings, and the automatic timer does the rest. Priced at $34.00.

The Versatile Tool Co., 122 Heywood Ave., West Springfield, Mass.

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PROPER USE OF

MIST COOLING



FOR DRILLING

Direct the mist at the point of contact of the drill and the work. For jig use, a 45° cut drill bushing and an angular hole drilled in the jig to accept the small (3/16") nozzle, provides "built-in" cooling efficency . . . right where it is needed. MISTIC MIST GENERATORS assure you longer drill life, better finishes, closer tolerances and greater production output. A proven fact!

Engineering service is available to help you with your cooling problems. Call MISTIC MIST . . . "pioneers in mist cooling generators"

AETNA MFG. CO.

177 S. York Rd. • POrter 6-3810 • Bensenville, Ill.

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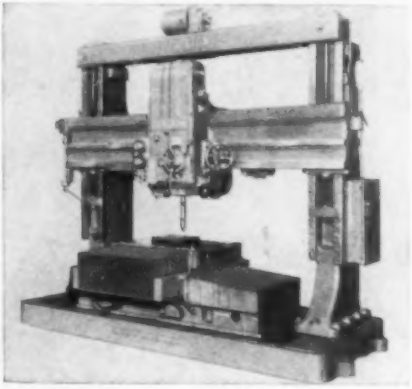


LEADING NAME IN BORING HEADS FOR 40 YEARS
19 MODELS *Write for catalog*
FLYNN MANUFACTURING CO.
133 FLOWERDALE AVE • DETROIT 20, MICH.

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Rigid Vertical Drilling and Boring Machine

The Model 3AR rigid vertical drilling and boring machine, produced for use with automatic positioning (or

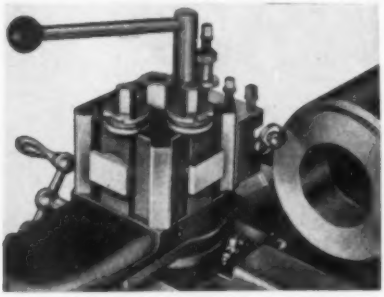


spacing) tables, applies automation to heavy-duty production hole drilling and boring. When equipped with the

BONI

PRECISION LATHE QUICK CHANGE TOOL HOLDER

ONCE SET, THE TOOLS WILL REPEAT WITHIN .0001"



SUPERIOR—Outperforms any other tool holder when it comes to precision, speed and rigidity. Five sizes available for center heights from 4" to 18" and over; for lathes up to 35 H.P.

RAPID—Tools are set on cross-slide **in seconds**; even the first setup is extremely fast; adjustment made with screw; no annoying shims, etc.

RIGID—Roughest cuts as well as finish cuts can be taken with ease; stronger and more rigid boring bars can be used.

VERSATILE—Suitable for both large production and individual operations; workpieces can be held in collets; automatic feed drilling can be done on lathe.

ECONOMICAL—Tremendous setup time is always saved.

PROFITABLE—Saved time and better finished work make for more profits.

MOST CONVENIENT—Tools are **always ready** in their holders; unlimited tool changes possible for any job.

OLD FASHIONED TOOLING CONSUMES PROFITS
MODERN TOOLING INCREASES THEM

Additional Manufacturers Agents Wanted

KARL A. NEISE, 404 4th Ave., New York 16, N. Y. Dept. BB

NEISE MODERN TOOLS

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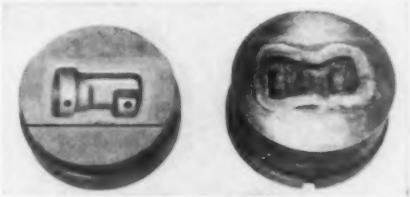
table, the machine is said to increase hole drilling production by positioning the work under the drill faster.

The machine has the advantages of twin screw elevating for the rails, and headstock movable to facilitate loading and unloading of positioning table.

The Carlton Machine Tool Co., Cincinnati 25, Ohio.

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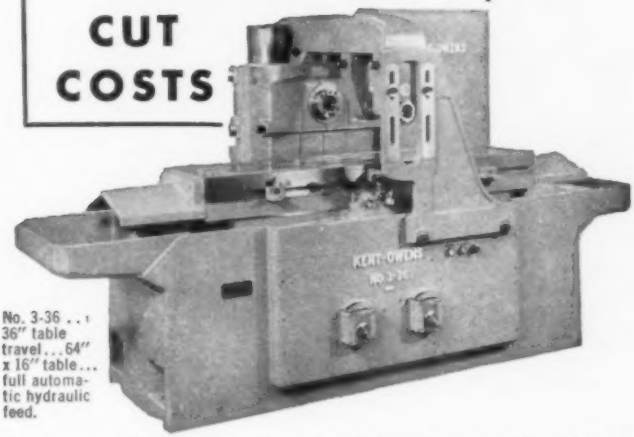
Stellited Dies By the Elox Process



The die illustrated produced 20,000 pieces before rework was required.

Mill Faster

CUT COSTS



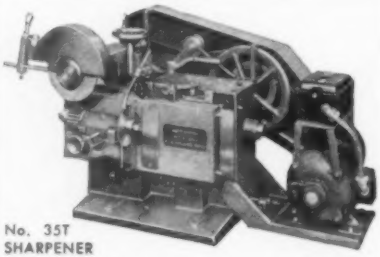
No. 3-36 . . . 36" table travel . . . 64" x 16" table . . . full automatic hydraulic feed.

Operators like 'em . . . because Kent-Owens Machines are extremely simple and practical. Turn out milling jobs *fast*, with minimum worker fatigue! Twin-post head mounting assures balanced load. Only two gear contacts, motor to cutter, for greater cutting efficiency. Write for bulletins on wide range of single and double spindle hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on **KENT-OWENS**

for MILLING MACHINES

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No. 35T
SHARPENER

AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to 5½" diameter and up to 1¾" thickness. 100 SAWS of 26 GAUGE CAN BE SHARPENED AT ONE TIME.

The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

The WARDWELL MFG. CO.
3807 RIDGE RD. CLEVELAND, O.

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Now it is possible to weld Stellite to the entire die, rather than just into sharp corners or points of wear, and sink the cavity by the Elox process.

Master cavities are used to cast Elomet (a zinc and tin alloy) into electrodes conforming to the cavity contour. These electrodes are mounted in the equipment over the blank, and the cavity is sunk. Since the process is based on an electrical discharge between the electrode and the workpiece, any conductive material, as Stellite, will be cut effectively. Stellited dies are said to wear up to five times as long as die steel dies.

Elox Corp. of Michigan, 1830 N. Stephenson Hwy., Royal Oak 3, Mich.

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Metal Cutting Band Saw For Horizontal or Upright Work

The Model 58-B convertible machine is designed as an upright band saw or for horizontal cut-off work. Of welded steel construction, it features a quick



YOU CAN BE SURE OF **Perfect Alignment** with **ROOFE Heavy Duty Bull Nose Centers**

Two double rows of quality bearings in the large and small ends of the nose of this Heavy Duty Bull Nose Center make perfect alignment positive on any type of work. **Two shank sizes provide diameters from ½" to 7½"** for a wide range of work with a single center. Write now for complete catalog.

HOUSTON GRINDING & MFG. CO., Inc.
P. O. BOX 7461 • HOUSTON 8, TEXAS

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Band saw set up for horizontal work.

action vise and adjustable blade guides.

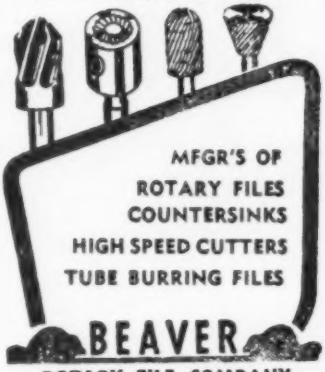
As a horizontal cut-off machine, the unit will handle rounds up to 6", rectangular shapes up to 6"x10" and 5"x 5" at 45°. The model converts to an upright saw by swinging the head to a vertical position and installing a work table. Selective speeds are 76, 141, and 268 fpm.

Wells Manufacturing Corp., 707 Coolidge Ave., Three Rivers, Mich.

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Save Dollars by Using Our Re-Sharpening Service



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BURNERS & FURNACES (Heat Treating, Melting, Soldering)

NO BLOWER OR OTHER POWER NEEDED

. . . just connect to gas supply!

Outstanding service since 1911! Each unit, with the famous "BUZZER" Venturi, delivers the hottest, quickest heat attainable without a blower. Full range control of heat and turn-down. Standards or specials available for manufactured, natural or liquefied gas applications.



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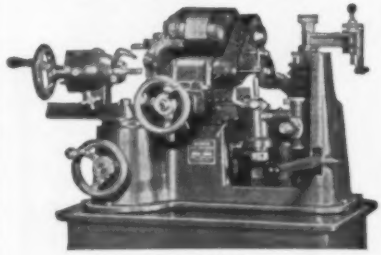
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HYBCO
TAP GRINDER

Sharpens Chamfers, Flutes and Spiral Points



Model 1100

- Capacities No. 0 Machine Screw to 1½" Hand Taps

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Bearing Assemblies Permit Increased Chip Load



Eliminates cutter breakage.

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NON-ROTATING SPINDLE BLADE TYPE MICROMETERS



For Measuring of narrow depth grooves, slots, keyways, splines, square threads, recesses and similar "hard-to-measure" surfaces.

Minute micrometer movements without damage to fragile surfaces.

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BLADE THICKNESS .030"
GAGING DEPTHS TO ¼"

Available Carbide-tipped

Spindle and Anvil Blades are hardened, ground and lapped to contact fit

Graduated in .001"
Ranges: 0-1", 1-2", 1½-2½", 2½-3½", 3½-4½" and others

Sold thru Tool Supply Houses

NON-ROTATING SPINDLE MICROMETER HEAD



to be built into fixtures, machine tools, delicate instruments and cross-slides.

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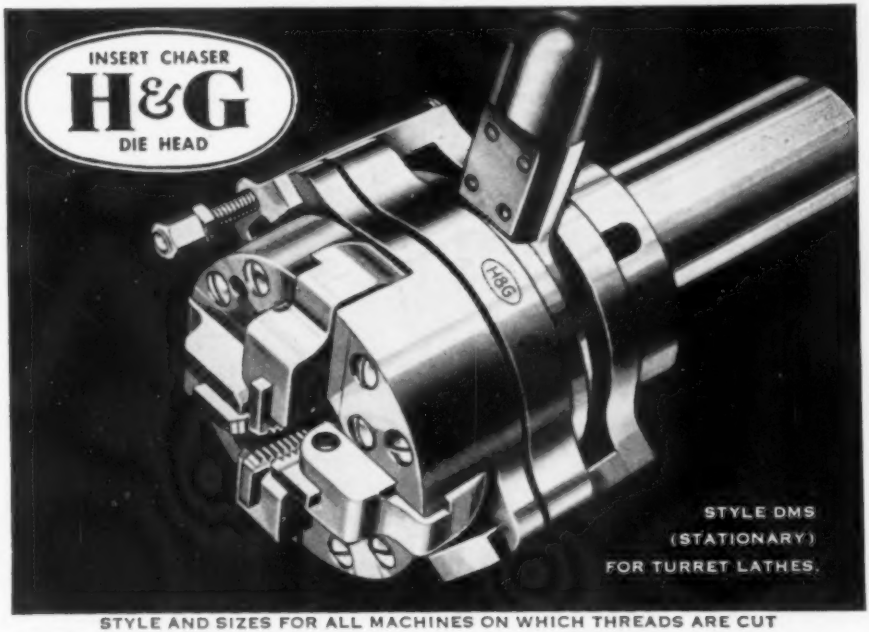
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The bearing assemblies are steel housings, equipped with Timken tapered roller bearings, hardened and ground bearing surfaces and pre-lubricated. They are machined to fit standard tapers found in overarm supports of horizontal milling machines and replacing conventional bronze bearings with steel bushings.

Increased chip loads and feeds are said to be possible because the bearing mounted directly on the arbor and the tapered rollers in the assembly gives rigidity. Cutter breakage is said to be eliminated. Bearings do not over-heat, seize or freeze.

Welch Industries, Inc., 11111 E. Rush St., El Monte, Calif.

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STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference *their cost is so low they can be even thrown away when dull.* For example, for less than $50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "UNIFIED AND AMERICAN SCREW THREAD DIGEST" sent free on request.

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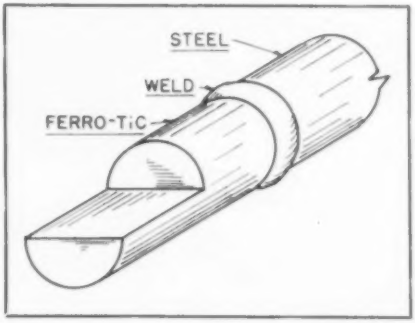
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71 W. Broadway • New York 7, N. Y.

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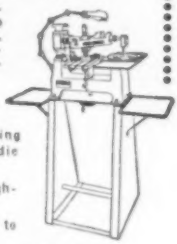
Machinable Carbide Arbors For Coil Spring Winding

The application of Ferro-Tic, the new machinable cemented carbide, to spring coiling arbors has been announced. In preliminary tests, the cemented carbide coiling and cut-off arbors for winding .218" dia. carbon steel wire into valve springs showed a threefold increase in the average



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in steel, other metals and plastics

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645 U.S. Route 22 Hillside, N.J.

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spring production over previously used tungsten carbide, according to the report.

Butt welding of the material to the steel arbor shank is reported to eliminate the possibility of braze failure often encountered with tungsten carbide tipped arbors. Since the material is readily machined in the annealed state, required fabrication is completed prior to oil-quench hardening. Once hardened, the cemented carbide arbor tip is said to be extremely resistant to the severe abrasive action inherent in the coiling operation.

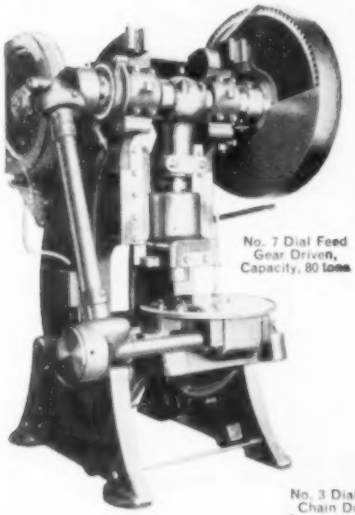
Sintercast Corp. of America, 134 Woodworth Ave., Yonkers, N.Y.

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automation at less cost!

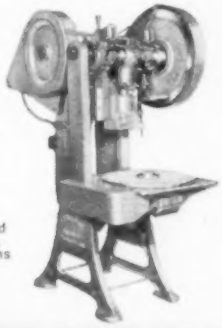
— eliminate specialized, more costly equipment!



No. 7 Dial Feed
Gear Driven,
Capacity, 80 tons

Federal Dial Feeds are your answer to greater production at lower costs. Equipped with special jigging, automatic feeds and ejectors, their applications are virtually unlimited and the need for specialized, more costly equipment is often eliminated. (One manufacturer increased production 600%.)

Add Federal's quality features and workmanship...and you've got a winner. Gear or chain driven with cam-type indexing mechanisms. Sizes 6 to 80 tons.



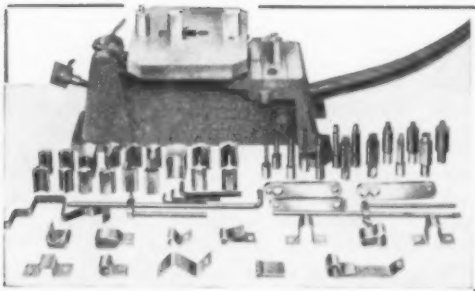
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Chain Driven,
Capacity, 26 tons

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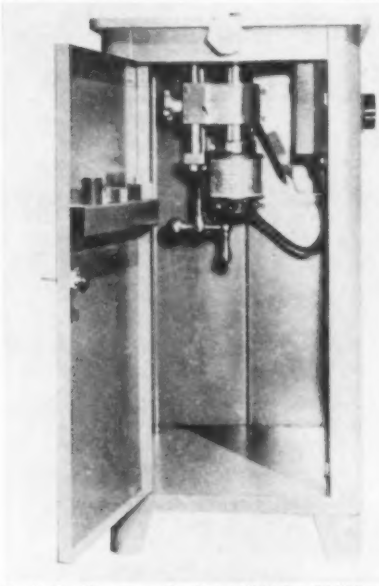
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CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅛"x1½" as illustrated, other models up to ½"x8".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

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Control offers speeds from 100 to 45,000 rpm.

Profile Grinder Features Micro-Feed Guide Button

The Pruitt Profiler P-500 has a micro-feed guide button which is said to allow reproduction of contours to tolerances of .0005" automatically. The finger-tip speed control offers instant, precise speed settings from 100 to 45,000 rpm, according to the announcement.

The routing, duplicating and grinding of metals, plastics, wood, glass or rubber is possible. Operations as template making, reproduction of parts from templates, and die sharpening become rapid and semi-automatic operations.

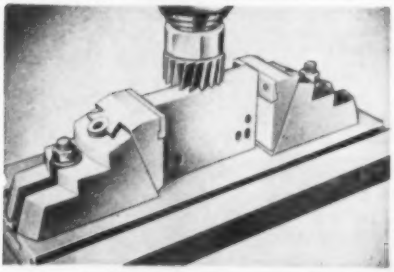
Larger models with ¾ hp and 1½ hp quills are available on special order.

Tool-Lab, Inc., Escondido, Calif.

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Precision Unit— 10 Tools in 1

Unimat, a precision tool no larger than a typewriter, is said to be ten tools in one, operating on just one base.



MASTER GRIPPING CLAWS System Hubner

WHY use them?

1. Clamping action **vertical** as well as **horizontal** — pressing workpiece **down** directly on the machine table. No hammering—no air between. 2. Gain more working room. 3. Faster and more secure setups. Easier to handle. 4. Unlimited jaw opening. 5. No straps overlapping on the workpiece; more machining surface. 6. Extremely versatile — take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents
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404 4th Ave., Dept. MT, New York 16, N.Y.

NEISE MODERNTOOLS

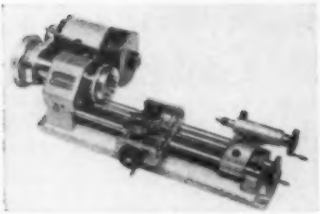
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It is designed for machining small parts made of steel, brass, aluminum, wood or plastics. The basic unit can be set up as a lathe, drill press, milling machine, tool grinder, polisher and hand drill.

Attachments are available and include jigsaw, table saw, threading attachment.

American Edelstaal, Unimat Division, 350 Broadway, New York, N.Y.

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Precision tool the size of a typewriter.



To indicate face runout, stand the Instrument Bench Centers vertically on precision ground headstock pads.

New! Instrument Bench Centers Speed Inspection of Miniature Parts



No. 9205M Instrument Bench Centers checking miniature crankshaft for concentricity after O.D. grinding operation.



Complete Line of Bench Centers

The Taft-Peirce Standard Bench Center Line includes models with work capacities from 8" dia. x 18" to 10" dia. x 60". Special sizes designed and built to order.

These new Taft-Peirce No. 9205M Instrument Bench Centers are specifically designed for speed, accuracy, and versatility in checking miniature and sub-miniature parts.

When placed horizontally on a surface plate of known flatness, the centers line up automatically within close limits, and a quick turn of a knurled knob locks them in position. The entire unit may then be turned up on end to check runout and squareness of shoulders and sides of grooves.

An exclusive feature is an adjustable headstock center point that may be rotated to bring the work centers perfectly parallel to the surface plate. This allows the inspector to obtain a precise reading of concentricity and parallelism in a horizontal plane, and shoulder runout in a vertical plane.

Maximum capacity — 8" long x 3" diameter. Send for Bulletin ST-005.

TAKE IT TO TAFT-PEIRCE

WOONSOCKET, RHODE ISLAND

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GRAYMILLS
Mist Coolant Systems



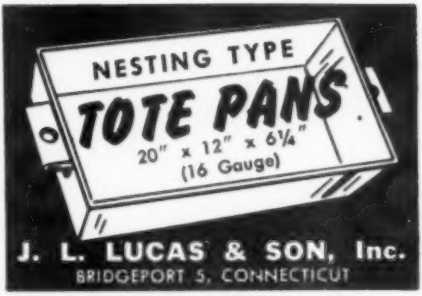
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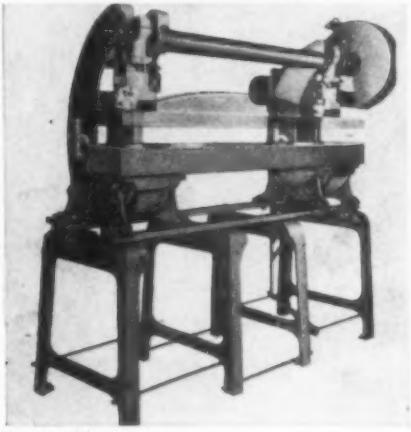
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J. L. LUCAS & SON, Inc.
BRIDGEPORT 5, CONNECTICUT

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8-Ton Multi-Ram Press for Gasket Cutting



8-ton multi-ram press.

The two presses offered are of eight-ton capacity, both rams operated simultaneously by means of a shaft equipped with universal joints at each end. Since only one flywheel is used, total capacity remains at eight tons.

Coil or sheet stock up to 37" wide can be accommodated between press-frame members. Designed for stamping, forming or trimming operations on large material of light gauge or soft composition, also on rubbed sheets, cloth, etc.

Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif.

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¾" x ⅛" Gage Blocks Measure Small Bores

A special set of gage blocks developed are adapted to high precision measurement of miniature and sub-miniature components, to measurement of chordal dimensions across serrations, the distance between cylinders located in ser-

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Portable — move directly to job; a time saver for both small and large shops.
3¼" stroke; adaptable for other work.
Low first cost, prompt delivery.
Good dealers wanted



Reading Machine Co.
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JIG BORING
to your specification

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Gage blocks for measuring miniature components.

rations and splines, or the space width of straight splines.

Although only ¾" x ⅛", the gages are made to inspection quality and can be wrung together to form any combination between .1000 and 1.5000" in increments of .0001", according to the firm.

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

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On jobs like this TAPMATIC'S performance is outstanding. Reducing production time in tapping operations, saving hundreds of man-hours of work. TAPMATIC tapping attachments prevent tool damage, work spoilage, inconsistent threads; setting new standards of excellence wherever they are used.



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Tapmatic has a model for every tapping operation: from the "100" for small, intricate work, to the big "800," for the tough jobs . . . all with Positive Torque Control, Weightless Floating Action.

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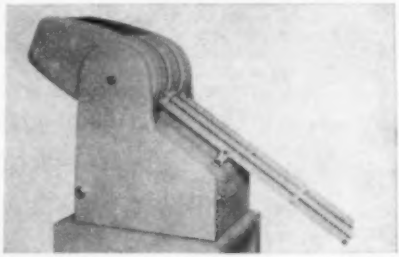
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Small Parts Feeder

The Hopperal sliding action hopper feeder was designed for the automatic feeding of small production parts.

The parts feeder selectively arranges bolts, nuts, screws, and other types of parts on an internal track, permitting them to file out orderly to the outside feed track.



Uses of feeder—assembly, inspection, gaging, packaging operations.

Haberstump-Harris, Inc., 10463 Northlawn Ave., Detroit 4, Mich.

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PIONEERS and PACEMAKERS in their line

—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles.

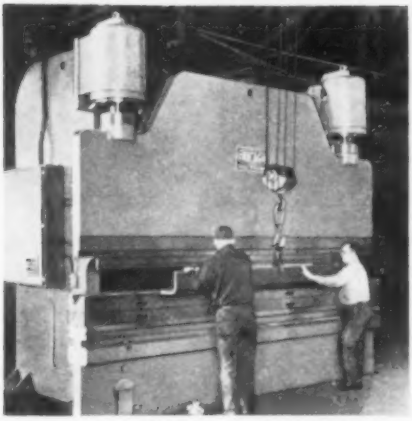
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THE GRANT MFG. & MACHINE CO.

CE Station, Bridgeport 5, Conn.

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Hydraulic press brakes are of heavy-section steel plate construction. Hard ram insert and sectional ram clamp are said to assure efficient use of all lengths of dies from very short to the full length of the ram.

Two direct-acting cylinders are bolted and keyed to the housings for accurate alignment. A servo system with mechanical tape arrangement phases the action of the two pistons so they always move in exact unison, keeping bed and ram surfaces parallel.

Capacities are from 300 to 2,000 tons.

Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill.

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Heavy Duty *Live Centers*

Write for catalog on live centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

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STANDARD TYPES

SLEEVES AND SOCKETS

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THE COLLIS CO.

DEPT. A, CLINTON, IOWA

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The gage is accurate to .000040". Air lines, plumbing, pressure regulators, etc., are not necessary, since the capacitance principles enable direct integration with the existing electrical conditions.

Electro-Autosizing Machine Div., Industrial Gauges Corp., 146 The Plaza, West Englewood, N.J.

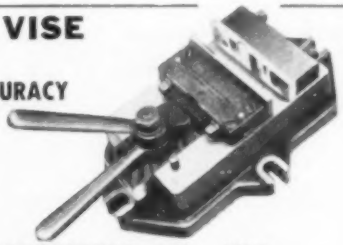
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TRADE MARK REG.
provides:
SPEED, POWER, STRENGTH and ACCURACY

All of the characteristics demanded for high speed production milling are found in this quick opening quick return vise. It saves making holding fixtures.

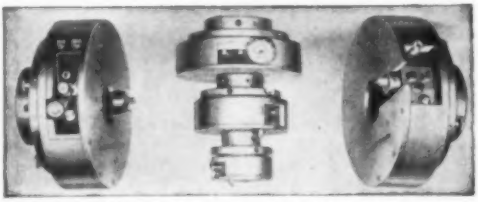
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Formerly the Hartford Vise now made by



PRECISION TOOL & MANUFACTURING CO., INC.
WESTFIELD, MASS. TEL. LOGAN 8-7322

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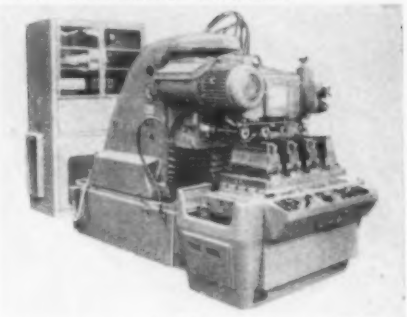
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Save many costly set-ups.
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An automatic Hydrocopy blade milling machine, the Rigid ST-100, provides new method of milling jet engine, gas and steam turbine blades up to 16" in length of blade section. Available as a two- or three-spindle machine, it is completely hydraulic-controlled. Working accuracy is ± .002".

The machine is equipped with a fully automatic machining cycle control with automatic switch-over from pendulum milling along the shroud to fast sweep milling along the length of the blade. Sweep-milling feeds up to 40 in./min. are possible. Feed rate remains constant over any profile up to angles of 80°. An additional transverse copying device permits three-dimensional machining of blades with angular shrouds.

Cosa Corp., 405 Lexington Ave., New York.

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Now you can obtain non-marring Lead hammers — Hammer handles — Make 'em yourself — Production and Ladle Molds. Free folder — ask about our Remelt allowance service.

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New KNURLMASTER Hand Knurler

$13.50



No distortion even on 1/8" stock! MODEL "C"

For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

Dealer Inquiries Invited

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LINLEY JIG BORERS

Give You Maximum Utility—At Low Cost



The improved Linley Jig Borers are more efficient than ever. Accurate and fast in operation—easy to set up. Made for the exacting requirements of small part precision work. Using Linley Jig Borers allows larger capacity borers to be used where intended, on heavier jobs. Once you've installed a Linley, you'll wonder how you got along without it in your shop.

Table Size: 7" x 17½"
Table Travel: 6½"x10"

Send for complete details.

LINLEY BROTHERS CO.

JIG BORERS - RIVET SPINNERS

663 State St. Ext., Bridgeport 1, Conn.

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New "HIGH SPEED" SOLENOID PUNCH Lowers Production Costs

Blow delivered in 1/5 sec. cycle on 110 volt single phase power. Exclusive positive alignment spindle design. Stakes, rivets, marks, cuts off, bends and crimps, etc.



FREE ASSEMBLY ENGINEERING SERVICE

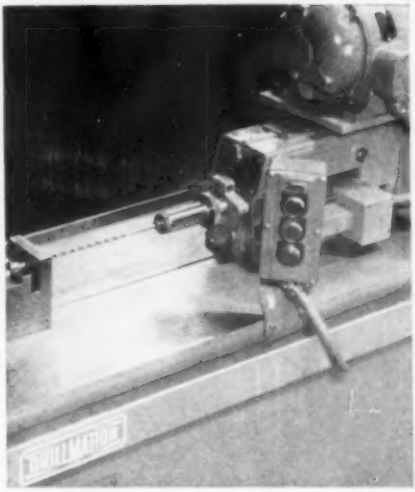
Just send samples or blue prints of parts to be assembled. We'll recommend the right tools, procedure and equipment to use . . . without cost or obligation.

We have the most complete line of riveting machinery so we can recommend the **correct type machine**, tooled and ready to go into operation.

HIGH SPEED HAMMER CO., INC.
311 Norton St., Rochester 21, N. Y.

HIGH SPEED Riveting Hammers - Stakers - Solenoid Punches - Noiseless Rivet Spinners - Hand presses - Wire Strippers - Sensitive Drilling Machines - Die Filers.

Power Drill Units



The heavy-duty Model 800 HD Drill-mation power unit features constant rate of feed with no fluctuation or dwelling, accurate control of drill

New CHI-CO® "Super-Flex" Collets

Outperform Them All!



Chi-Co "Super-Flex" Collet
(Patented)

- **Finest Accuracy**—Automatic precision alignment. Test-bar inspected for true alignment within .0002 at nose; within .0004 one inch from nose; within .001 four inches from nose. True concentricity.

- **Double Holding Power**—with half the pressure. Longer more uniform gripping area. Won't slip. No scarring or burnishing tool shafts.

- **Automatic Tool-Ejection**—"No pounding" to loosen grip. Patented Chi-Co Ejector Nut speeds tool changes. Saves manhours and equipment damage.

Wider cap. range, 4 series, 1/8" to 2½" (1/32" increments). Finest Maxel steel, lasts years longer. Machinists choice for all machines. **Only Chi-Co Super-Flex is guaranteed!** (Trade-Name on skirt of every Chi-Co Collet). Write for data.

CHI - CO, Inc,
Ledge Rd., Northfield, O., IMperial 7-7121

Use postpaid card Circle No. 445

spindle rpm's, no vibration through the complete unit, and a positive piston-type pump administers hydraulic pressure in a straight line directly behind and axial to the center line of drill and spindle, according to the firm.

The units are designed for the fast, precise drilling of titanium, stainless steel, and other special metals used in missiles, supersonic aircraft.

Drillmation Corp., 6500 E. Eleven Mile Rd., Centerline, Mich.

Use postpaid card. Circle No. 155

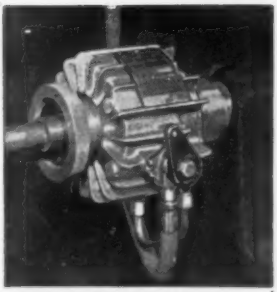
Anti-Rust Compound

A neutralizer compound has been developed to eliminate the rusting and tarnishing of iron and steel parts after surface finishing. It is a dry, non-abrasive blend of alkaline materials. The compound contains anti-rust properties that neutralize the effects of acid compounds used on metal surfaces during barrel finishing for removal of heat-treat scale.

Roto-Finish Co., 3700 Milham Rd., Kalamazoo, Mich.

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WILSON AIR COLLET CLOSER



STEP UP PRODUCTION 20% +

. . . for most lathes to 1" bar stock capacity

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

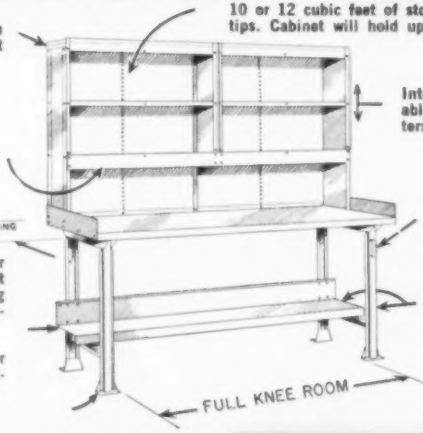
WILSON AIR COLLET CLOSER, INC.

909 40th Ave. NE, Minneapolis 21, Minn.

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BAY "HANDICABINET® BENCHES

THE GREATEST MODERN ADVANCE IN WORKBENCH DESIGN



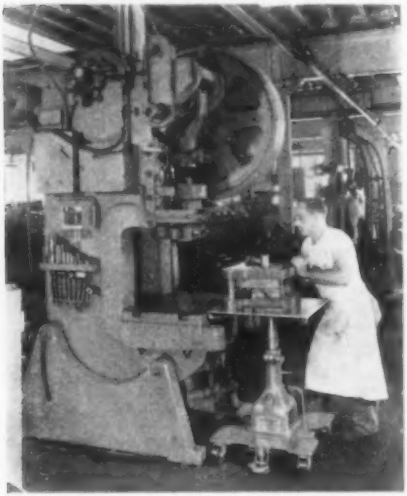
Other Models and Styles available. Write for catalog and name of your nearest Bay Distributor.

1827 W. Cambria St. Philadelphia 32, Pa.

BAY PRODUCTS INC.

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THE BEST
PORTABLE
ELEVATING TABLE
YOU CAN BUY . . .
(Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

A precision made
MIDWEST TABLE
Costs no more!

- It's hydraulic . . . positions work or feeds at desired height without use of hands
- Rigid cast construction
- Top turns 360° and clamps
- Foot release valve to lower
- Machined top surface can be used as work table
- Roller bearing casters with ball bearing swivels
- Floor clamping available extra

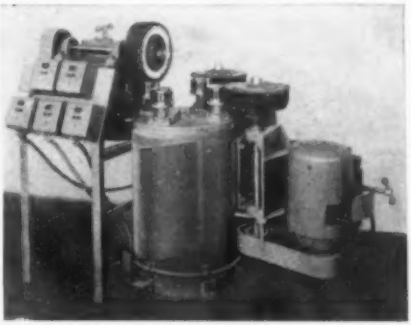
Write today . . . specials on request

MIDWEST
TOOL & ENGINEERING CO.
112 WEBSTER ST., DAYTON 2, OHIO
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Automatic Polishing Unit Fits 6'x8' Floor Area

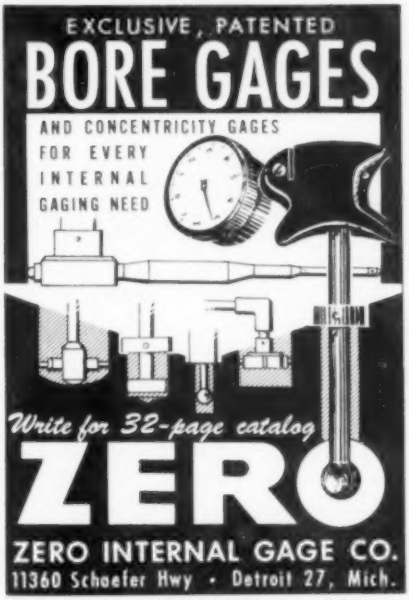
Automatic polishing and buffing equipment, the Junior Automatic, consists of a basic dial table with four, powered work spindles and optional manual or automatic indexing with adjustable dwell.

Murray-Way Corp., Birmingham, Mich.



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BORE GAGES
AND CONCENTRICITY GAGES
FOR EVERY
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GAGING NEED



Write for 32-page catalog
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ZERO INTERNAL GAGE CO.
11360 Schaefer Hwy · Detroit 27, Mich.
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CAM MILLING

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring** and **Thread Grinding** facilities as well as modern **Cam Milling** and **Cam Grinding equipment.**

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.
23-22 44th Road Long Island City 1, N. Y.

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Put Muscles In Your Lubricants

MOTOR MICA

ANTI-FRICTION COMPOUND

A clean white powder. Improves cutting oils. Dies last longer. Solves tough lubrication problems. Ask for free samples.

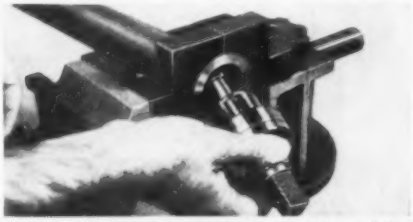
SCIENTIFIC LUBRICANTS CO.
3469 N. Clark St. Chicago 13, Ill.

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Spinning & Burnishing Tools Cut Rejections

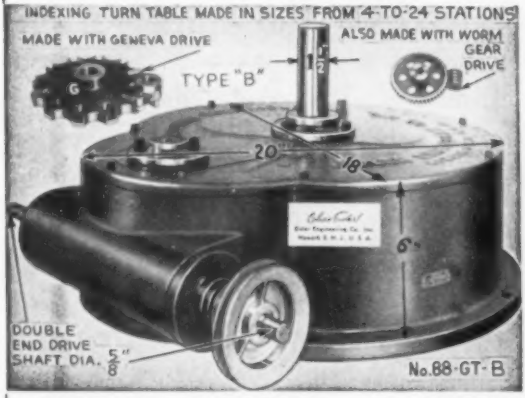
Performing three operations at once, the Ideal spinning tool increases production, decreases costs and does a superior job of creating a durable, leakproof joint, according to the announcement.

In one operation, the spinning tool expands, sizes and burnishes. Adjustable spacer rings regulate the degree



The spinning tool is inserted into the tube and the mandrel is pushed forward until it engages the expanding tools.

INDEXING MACHINERY — CAMS — GENEVA GEARS — TURNTABLES





MFG. REP. WANTED **ASK FOR CATALOG No. 88-57**

DR. CHARLES EISLER ME. FOUNDER **CHARLES EISLER, JR. PRES.**

EISLER ENGINEERING CO., INC.

762 SOUTH 13th STREET **NEWARK 3, NEW JERSEY**

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TAPER PINS

ALSO FOR

- MACHINE RACKS
- WOODRUFF KEYS
- MACHINE KEYS

STANDARD TAPER PINS are milled from carefully selected bar stock for extremely close tolerances . . . straight to taper. The uniformity and accuracy of STANDARD TAPER PINS will save time on assembly . . . will assure you of trouble-free service. Available in STANDARD steel . . . also in stainless steel and brass. Specify STANDARD TAPER PINS and other STANDARD products.

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BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

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of expansion obtained with the tool, and also act as a safety feature.

The tool is designed for use on straight or bent tube elbows having a 2:1 center line bend radius.

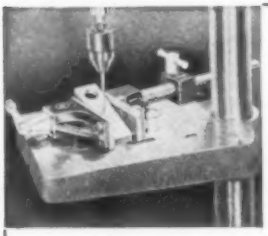
The Gustav Wiedeke Co., 1833 Richard St., Dayton 1, Ohio.

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Jig Borer Features Accurate Co-Ordinate Table

The Perrin-Swiss jig borer is equipped with a co-ordinate table which incorporates a built-in optical system. The machine is particularly suited for the manufacture of jigs, gauges, dies, fixtures, prototypes, as well as for production runs.

Readings are permitted to .0001". An infinitely variable range of spindle speeds from 50 to 3200 rpm is powered by a 2 hp motor. Three power feeds are provided—.002", .004" and .008" per revolution of the spindle.



AMF Wahlstrom Automatic Keyless Chuck: Convert 95% of lost tool-changing time to productive time. A single chuck does the work of several spindles. The greater the load, the tighter the grip. No stopping of the spindle to change tools.

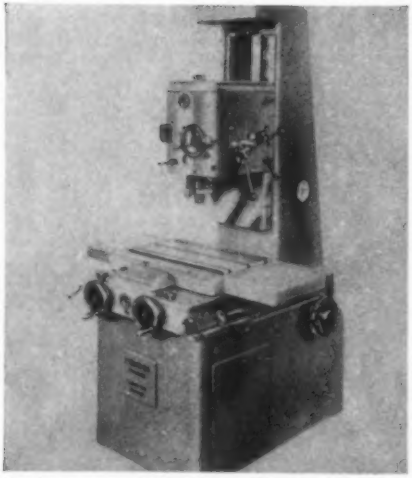
AMF Float-Lock Instant Change Vise: Positive anchoring on drill press table. *Floats and Locks* in any position. Holds work safely for accurate drilling and tapping.

NOW: TWO WAYS TO INCREASE PRODUCTION

Write for details and name of nearest distributor.

AMF Tool Division
AMERICAN MACHINE & FOUNDRY COMPANY
224 Glenwood Avenue, Bloomfield, N.J.

Use postpaid card. Circle No. 454



Jig borer equipped with precise Swiss-designed optical system with accuracy to .0001".

S & S Machinery Co., 140 53rd St., Brooklyn, N.Y.

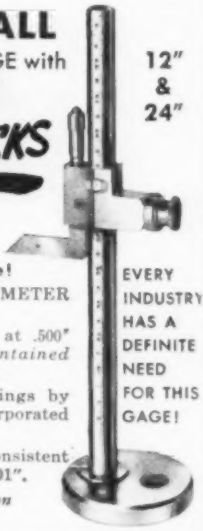
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MICROBALL

The HEIGHT GAGE with

BUILT-IN GAGE BLOCKS

12" & 24"



Easy Micrometer Readings Replace Difficult Vernier Scale!

- DIRECT MICROMETER READINGS.
- Positive indexing at .500" intervals by *self-contained* hardened steel balls.
- Intermediate settings by micrometer gage incorporated in the design.
- Easy readings of consistent accuracy to within .001".

Complete information on request.

EVERY INDUSTRY HAS A DEFINITE NEED FOR THIS GAGE!

FOSTER SUPPLIES CO.

6122 Milwaukee Ave., Dept. MTBB, Chicago 46, Ill.

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BLUE VALLEY

FLANGING MACHINES and CIRCLE SHEARS

No. 1 10 Ga. Circle Shear and Flanger.

No. 3 ¼" cap. Flanger for flat heads 19" to 12'.

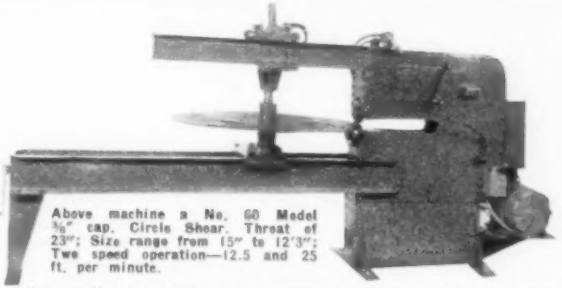
No. 4 ⅜" cap. Flanger for flat and dished heads 20" to 12'.

No. 5 ½" cap. Flanger for flat and dished heads 24" to 20'.

No. 6 ⅝" cap. Flanger for flat and dished heads 24" to 20'.

No. 7 ¾" cap. Flanger for flat and dished heads 28" to 20'. Up to 8" knuckle radius.

No. 56 Model 3/16" cap. Elliptical Head Shear and Flanger.



Above machine a No. 60 Model ⅜" cap. Circle Shear. Throat of 23"; Size range from 15" to 12'3"; Two speed operation—12.5 and 25 ft. per minute.

No. 40 Model ¼" cap. Circle Shear; Throat of 15½"; Size range from 15" to 12'3".

BLUE VALLEY MACHINE & MFG. CO.

6832 Truman Road KANSAS CITY 26, MO.

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SAVE SPACE WITH A

SERIES 8055

COMBINATION MODEL

The Series 8055 is two electric heat treating furnaces (Hardening 2,000° F. and 2,300° F., and Drawing 800° F. and 1,250° F.) in the floor space of one furnace. Each furnace is independently controlled permitting hardening and drawing operations to be performed at the same time. All models are delivered with separate controls for each furnace. The 8055 series is made in nine standard sizes . . . other models are made to your specifications. Furnaces operate on standard line voltage . . . no transformer necessary. A hardening and preheating combination is also available.

Write for a free catalog of the entire Lucifer line. Engineering advice is offered without obligation. Write, wre or call . . .

LUCIFER

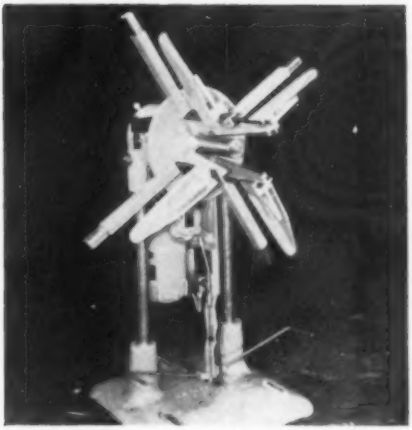
FURNACES, INC.

NESHAMINY 1, PA.

Phone: Diamond 3-0411

Use postpaid card. Circle No. 457

Stock Reel



Model ACR-10-40 U.S. motor-driven centralizing type stock reel, suitable for material up to 10" wide, coils with I.D. from 10" to 22½", O.D. up to 40", weight capacity 600 lb. The unit is arranged with loop control mechanism, reversing switch, and a 1/3 hp motor.

The expansion and retraction of the cross arms of the reel, to vary the inside diameter, is by power.

U.S. Tool Co., Inc., Ampere (East Orange), N.J.

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Roll Lifters Adapt Machines to Die Work



Arrow points out roll lifter.

Automatic roll lifters are now furnished as optional features on Littell No. 4 hydraulically driven feeding and straightening machines, to adapt the machines to progressive die work. Stock up to .050" x 24", or .125" x 4" is handled. Operated by air, the roll lifters are electrically actuated by the ram of the press.

All reports on the roll lifters indicate perfect performance on the most difficult progressive die operations, according to the announcement.

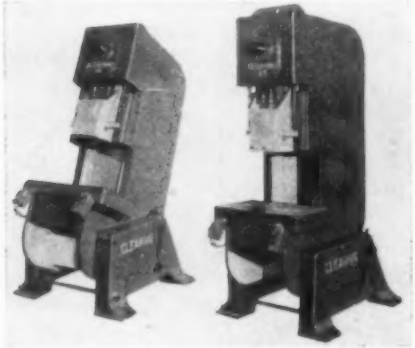
F. J. Littell Machine Co., 4101 N. Ravenswood Ave., Chicago 13, Ill.

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Newly Designed Inclinable Presses

The Torc-Pac line of O.B.I. presses features an air-friction clutch and brake as standard equipment. The clutch and brake plates are of long wearing, sintered bronze, and operate in an oil bath at all times.

The integral drive unit—which consists of all working members of the drive and slide—can be removed from the press as a single unit.



Standard in 22, 32 and 45 ton capacities—32 and 45 pictured.

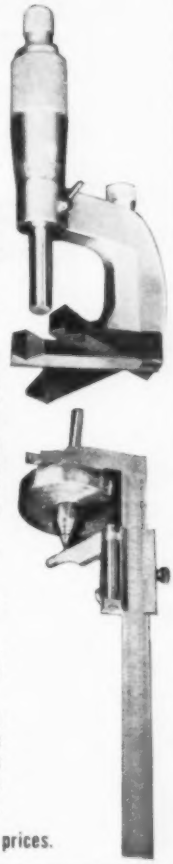
Clearing Machine Corp., Div. of U.S. Industries, Inc., 6499 W. 65th St., Chicago 38, Ill.

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WHAT INDUSTRY HAS BEEN WAITING FOR!

REVOLUTIONARY features in Swiss-made micrometers and Vernier calipers.

SAVES TIME — SAVES MONEY



MICROMETERS: 0-1" 0-2" and 0-3", reading .0001.

- 6 interchangeable anvils for all-purpose application.
- **Anvils can be rotated a full 360° on a plane parallel to measuring surfaces.**

VERNIER CALIPERS: 10" and 7", reading .001.

- **Have amazing hinged lower jaw, swinging 180° and 360°, respectively, making measurement between points on two different axes as easy as between points on a single axis.**
- Have scales for angular measuring.
- Graduation photographically etched.
- Jaws have broad surface, affording sure and firm grip.
- Made of the finest tempered stainless steel these instruments symbolize the ultimate in Swiss craftsmanship.

Write for literature and prices.

Areas still available for representatives.

POLYPLAN Co.

45 West 81st St. New York 24, N.Y.

Tel: Susquehanna 7-8220

Cables: POLYPLAN

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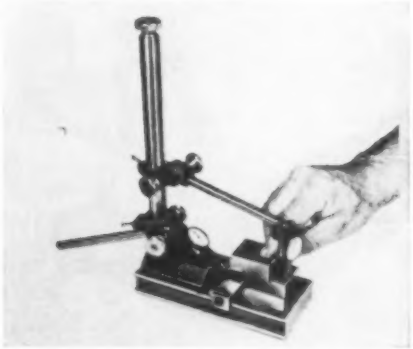
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Complete Facilities For
CAM MILLING and
CAM GRINDING
To Your Specifications
COLUMBIA CAM CO.
26-11 Jackson Ave., Long Island City, N. Y.

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DANNEMAN Precision DIE-SETS
Precision-Bored on Master Plates
DANNEMAN DIE-SET DIVISION
ACME-DANNEMAN COMPANY, Inc.
201 Lafayette St. New York 12, N. Y.
CATALOG ON REQUEST

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Dial Test Set And Comparator



Dial test set & comparator has sliding swivel.

A combination dial test set and comparator, with versatile Rocheleau sliding swivel, is a time saver on boring mill, jig borer, lathes, milling, or shaping or planing machines.

When used as an indicator test set, it can be adjusted vertically and horizontally. Smooth, positive positioning of the dial indicator is accomplished. Individual adjustment can be made.

The unit is also used as a universal surface gage. The important sliding swivel feature is said to give fine adjustment and allow scribing of lines to fine tolerances.

Rocheleau Tool & Die Co., Inc., 650 N. Main St., Leominster, Mass.

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Rotary Table Grinds Tolerances Within .000050

The Roto Grind, a precision made rotary table, is said to reduce grinding time as much as 500%. This grinding fixture, with 10" motorized table, grinds tolerances within 50 millionths with

"Jorgensen" and "Pony" CLAMPS
Ask Your Supplier
send for free 32-page catalog
the clamp folks / ADJUSTABLE CLAMP CO.
403 N. Ashland, Chicago 22, Ill.

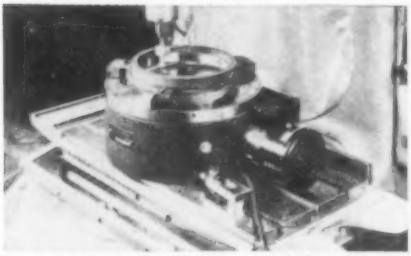
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JIG BORING
and
Large Precision Machining
Done to your specifications
WE HAVE 22 JIG BORERS
KIDDE PRECISION TOOL CORP.
25 LOCUST AVE. ROSELAND, N.J.

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little effort, it is reported. The table turns under the wheel.

The fixture is designed to fit a jig



Rotary table handles large or small diameters.

grinder, and to handle large or small diameters. It gives fast external and internal grinding.

M-M Tool Mfg. Co., Dayton 2, Ohio.

Use postpaid card. Circle No. 164

No Pinions or Gears Used on Dial Indicator

The indicator features linear accuracy well within A.G.D. standards. The hand is said to respond to minute movement of .00002 or better. No



Dial indicator.

pinions or gears are used. The step down dial and sharp hand pointer permit accurate readings.

All internal bearings have sapphire jewels for long life and smooth frictionless operation.

Boice Gages, Inc., Hyde Park, N.Y.

Use postpaid card. Circle No. 165

True Conical Grinding on a STERLING Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.



$550.00

F.O.B. Eau Claire, Wis.

STERLING "DV" CAPACITY

90°—140° Included angle with variable clearance angle set with built-in gage on all 2, 3 & 4 flute drills from ⅛" to 2½" diameter.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

Ask your STERLING Dealer for complete information on all STERLING Drill Grinders or write direct

McDONOUGH MANUFACTURING CO.

1520 GALLOWAY • EAU CLAIRE, WISC.

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2 Applications

(Regular and Superficial)

1 Tester



KENTRALL MODEL CT-2 $750.

Hundreds of installations over the past few years have proved the economy of the only hardness tester which combines all scales of Rockwell Test (15 to 150 kg. loads).

The Kentrall cuts costs because it does the job of two conventional testers, requires only half the space and maintenance. Write for more detailed information, plus a list of prominent users who have switched to Kentrall. TB147

KENTRALL

THE TORSION BALANCE COMPANY

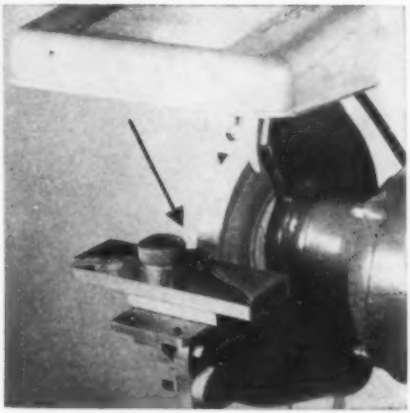
Main Office and Factory:

Clifton, New Jersey

Sales Offices: Chicago, San Francisco

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60 Degree Angle Tool-Grinding Attachment



A simple attachment for quickly and accurately grinding 60° angle thread-cutting tool bits eliminates the slow and painstaking grinding as well as the constant comparing with a 60° gauge.

The unit is designed for use with any conventional pedestal tool grinder or bench grinder used in large machine shops or small hobby shops. It has only two moving parts and is made of hardened and ground steel.

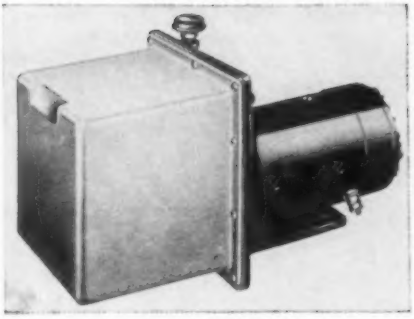
Horst's Machine and Experimental Shop, 2801 Steele St., Denver 5, Colo.

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Hydraulic Units Engineered to Application

From standard pumps, motors, valve and reservoirs, a self-contained unit in countless variations can be furnished to provide ½ to 4 gpm at 1800 rpm with pressures up to 2000 psi; increased delivery at 3600 rpm.

Pumps can be supplied with any or all features such as check valve, relief valve, and manual or solenoid operated lowering valves. Duplex pumps or pumps with built-in unloading valves



or special hydraulic features can also be supplied.

Direct or belt-driven drives are offered, as well as air motors or other special drives for volume applications.

Continuous or intermittent duty motors are offered in AC (standard electric from ¼ hp through 2 hp) or DC in 6, 12, and 24 volts.

John S. Barnes Corp., 301 South Water St., Rockford, Ill.

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MEASURE THE *Value*
OF THE MANY CARR-LANE
JIG AND FIXTURE PARTS

PINS
PINS
MILL KEYS
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Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

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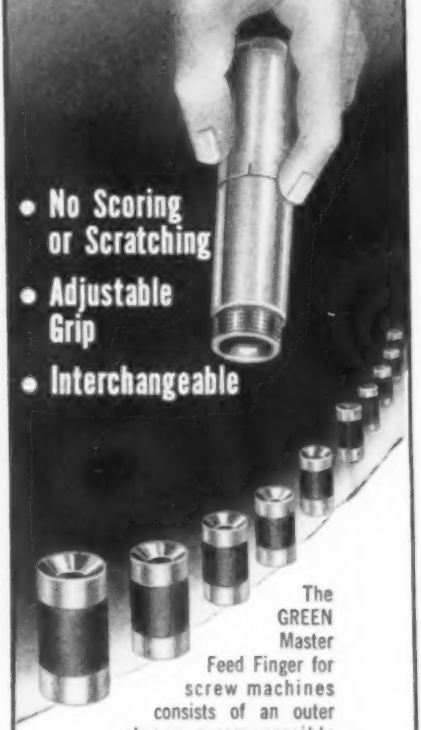
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Dealers in Tool Room Equipment

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GREEN
MASTER FEED FINGERS



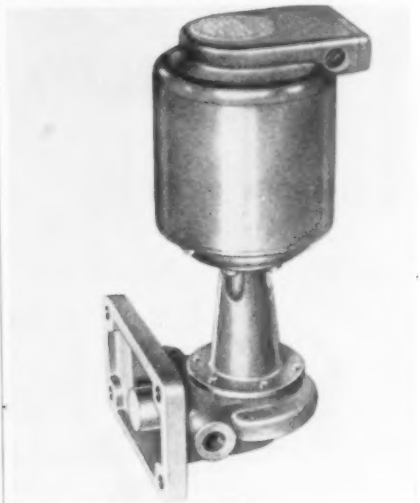
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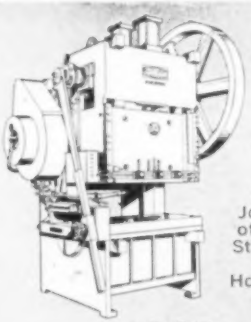
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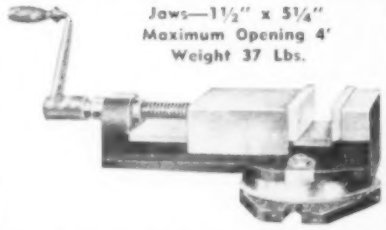
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Jaws—1½" x 5¼"
Maximum Opening 4'
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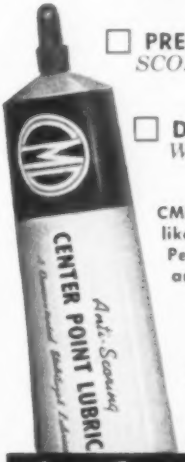
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CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

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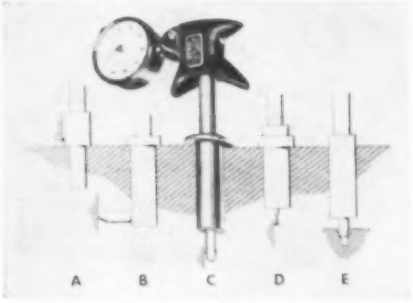
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Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.

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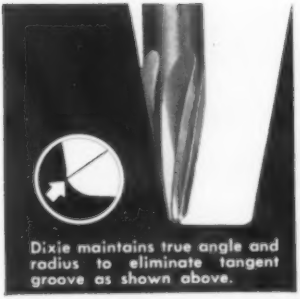
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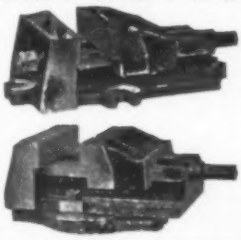


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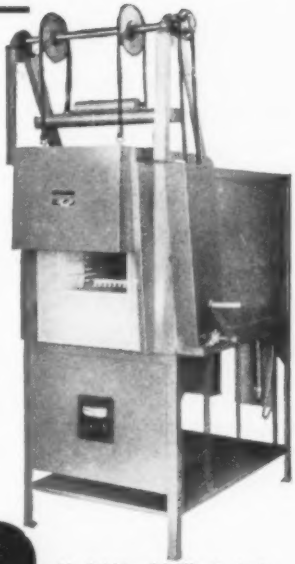
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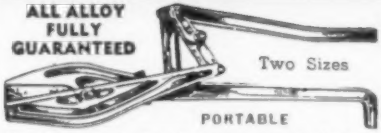
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BY A QUICK, EASY INEXPENSIVE METHOD
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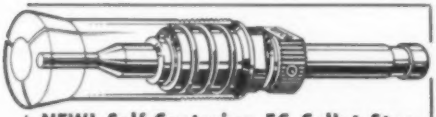
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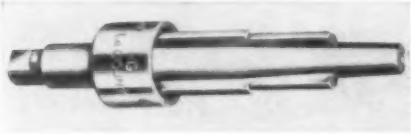


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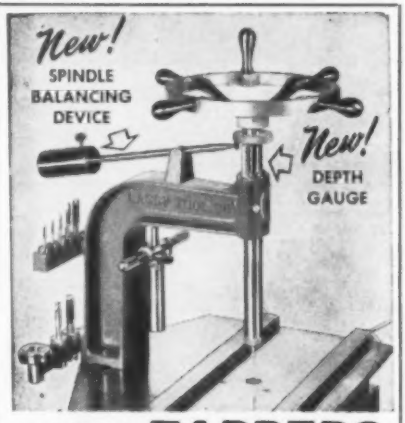
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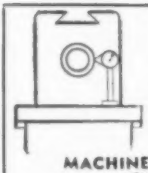
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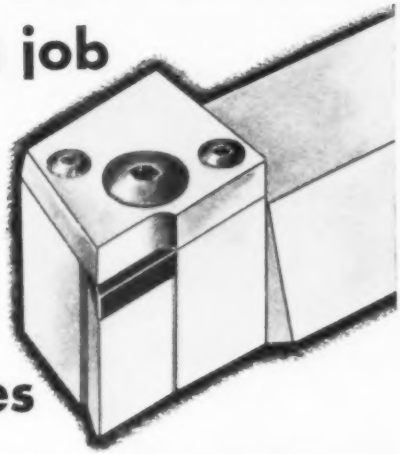


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PRIME MANUFACTURERS OF REFRACTORY METALS ENGINEERED FOR THE JOB

C-703-S

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Products Index

MACHINE AND TOOL blue book

A

Abrasive Belt machines (See: Grinding Machines, abrasive belt)
Abrasive Cloth, Paper, Discs, Wheels, Stones, Belts, etc, 209
Abrasive Cut-off Machines, 309
Abrasives, 46-47, 192a
Abrasives, Coated, 192a
Abrasives, rubber cushioned, 209
Actuators, 128a-d
Adapters, 29
Air-Operated Equipment, 95
Alloys, 66
Aluminum & Aluminum Alloys, 66
Angle Irons, 232
Angle Plates (See: Plates, Angle)
Angles, 232, 252
Arbor Spacers, Shim Stock, 246
Arbors, 74, 283
Assembly Machines, 179
Automation Equipment, 80-81, 155

B

Balls, 297
Bar Machines, automatic, 81, 92
  Swiss type, 149
Barrel Finishing Equipment, 53
Bars, bronze, 71
  steel (See: Steel, bars)
Bearings, ball, 139
  bronze, 71
  roller, 139
  thrust, 139
Benches, work, 252, 287
Bending Machines & Equipment, 221, 266, 278
Bin Units, 252
Bits, tool, 31, 25
Blades, band saw, 2d cover, 22, 153, 188
  cut-off (See: Tools, cutting-off, blade)
  hack saw, 2d cover, 22, 153, 165, 188
  work support, 63
  circular form tools, 64
Blocks, 32
Blanks, 62, 64
  step, 226
  V-, 32, 207, 232, 276
Bolts, 226
Boring Bars and Tools, 31, 44, 150, 225
Boring, Drilling and Milling Machines, 160a-b
Boring, Facing Tools, 54
Boring Heads, 84, 150, 259, 270
Boring Machines, 82
  jig, 31, 70, 285
Boring Mills, vertical, 48-49
Boring Spindles, 128a-d
Boring Tools, 246
Brakes, 163, 192b-c
Brass Stock, 71
Broaches, 60, 154, 128a-d
  keyway, 60, 154
Broaching Tools, 154
Bronze Stock, 71
Buffers, 61, 88
Burrs, 32a-b, 273
Bushings, 31, 71, 77
  drill jig, 77, 128a-d

C

Calipers, 293
Cam Grinding, 294
Cam Milling (service), 289, 294
Cams, 230, 289
Carbide, sintered blanks, 300
Carbide Stock, 66, 219, 307
Carbide Tools (See: Tools, carbide)
Castings, 219
Centers, bull nose, 272
  instrument bench, 279
  lathe, 283
  live, 200, 268, 283
Chamfering Tools (See: Tools, chamfering)
Choppers, scrap, 282
Chucks, 12-13, 44, 82, 96a, 283
  automatic, 96a, 290
  boring, 31
  collet, 235
  compensating, 235
  drill, 12-13, 235
  keyless, 290
  lathe, 251
  pinch jaw, 96a
  power, 235
  scroll, 44, 251
  sine, 207
Clamp Sets, 26
Clamps, 278, 294, 297
  air-operated, 217
  "C", 294
  fixture, 217, 278
  strap, 226
  toggle, 217, 226
Clinchors, 213
Clutches, 311
  friction, 311
Collet Closer, 287
Collet Stops, 303
Collets, 82, 283, 286, 320
Comparators, 20, 56, 171, 185
  dial, 171, 185
  optical, 20, 199
Compounds (See separate listings)
Contract Work, 96, 271, 280, 286, 305
Control Systems, tool, 29, 56
Coolant Filters, 24, 205
Coolant Mist Generators, 269, 280
Colant Nozzles, 303
Coolant Systems, 24, 280
Coolants (See: Cutting Fluids)
Counterbores, 92, 140, 156, 264
Countersinks, 85, 273
Cut-Off Blades (See: Tools, cutting-off, blade)
Cut-Off Machines, 2d cover, 147, 155, 189, 203, 234, 309
Cut-Off Wheels (See: Grindng Wheels, cut-off)
Cutters, 59, 140, 213, 273, 301, 319
  blade, 23
  port contour, 140
Cutting Fluid, Oils, 24, 75, 180
Cutting Fluids, Bacterial for, 37-39
Cutting Tools (See tool section)



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Cylinders, 213, 235, 239
  hydraulic, pneumatic, 213, 235, 239

D

Dairy Equipment, 128a-d
Dial Feeds, 250
Dials, 284
Dial Indicators, 171, 256
Diamond Wheel Dressers, 240, 297
Diamond Wheels, 212, 240
Die Casting Compounds, 180
Die Filers, 286
Die Heads, 82, 95, 275
Die Makers' Supplies, 123
Die Sets, 10, 294
Die Stock, 63, 219
Dies, 36, 62, 66, 96, 182, 230 262
  blank forming, 66, 96, 262
  carbide, 66
  perforating and magnetic, 36
  press brake, 36, 66, 96, 262
  progressive, 36, 96
Downel Pins, 238
Drawer Units, 252
Dressers, wheel, 31, 220, 240
Drill Guides (See: Bushings, drill jig)
Drill Heads, 79, 197, 198, 210, 245, 257
  multiple spindle, 198, 210, 245, 257
Drill Tables, 201
Drilling Attachments, 79, 197, 198, 210, 245, 257
  multiple spindle, 198, 210, 245, 257
Drilling Machines, 41, 303, 317
  radial, 3d cover
  sensitive, 286
Drilling & Tapping Machines, 133, 210
Drilling Units, 41
Drills, 85, 196, 303
  carbide, 196, 258
  twist, 258
Drivers, 179
  drill, 29
  tap, 29, 85
Drives, geneva, 300
Duplicating Machines, 149, 3d cover
Dust Collectors, 61, 233, 254

E

Electro Chemicals, 192a
End Mills (See: Milling Machine Cutters)
Engraving Machines, 276
Engraved Products, 284
Fabricating Tools, 182
Facing Heads, 259, 284
Facing Tools (See: Tools, facing)
Feeds, 315
  automatic, 228, 250
  dial, 250
  roll, 228, 250, 282
Feeler Stock, 246
Files, 32a-b, 273
  oilstone, 192a
  rotary, 273
Filters, 205, 243
Filtration Equipment, 205, 243
Fingers, feed, 298
Flanging Machines, 291
Flat Stock, ground, 188
Flexible Shaft Machines, 255
Floor Cleaners, 247
Forgings, 219
Forming Machines, 69, 204
Furnaces, electrical, 78, 128, 231, 292, 303
  heat-treating, 78, 128, 144, 231, 273, 292, 303

G

Gages, 56, 242
  air, 236
  bench, 242
  bore, 288
  comparator, 242
  concentricity, 288
  cylindrical, 16-17
  dial, 260
  dimensional, 242
  height, 25, 56, 291
  internal, 260, 288
  pin, 25
  plug, 16-17, 25, 260
  plug reversible, 16-17, 260
  ring, 16-17, 25, 260
  surface finish, 25, 171
  thread, 16-17, 25
Gaging Equipment, 236, 242
Gear Production Equipment, 67
Gear Shaping Machines, 50-51
Gears, 261
  Geneva, 289
  helical, 261
  spiral, 261
  worm, 261
Graduating Machines, 45
Grinders, portable, 145, 263
Grinding Machines, 192a
  abrasive belt, 61
  bench, 222
  carbide tool, 61, 145, 222, 267
  contour, 313
  cylindrical, 11, 33, 190
  disc, 88
  drill, 20, 295
  floor, 222
  flute, 190
  form, 267
  heavy duty, 88
  internal, 11, 190
  jig, 31
  optical projection, 267
  oscillating spindle, 267
  pedestal, 222
  precision, 11, 20, 33
  profile, 267
  rotary, 43
  spline, 190
  surface, 11, 20, 33, 43, 46-47, 135, 169, 190
  tap, 274
  tool & cutter, 8-9, 20, 149, 190
  vertical spindle, 33, 43
  wheel, 61
Grinding Attachments, 169
Grinding Spindles, 128a-d
Grinding Wheels, 1, 26-27, 46-47, 135, 192a, 212, 309
  cut-off, 1, 26-27, 46-47, 135, 309

H

Hammer Molds, 285
Hammers, lead, 285
Handles, 237, 285
Hardness Testing Equipment, 248, 296
Hinges, 247
Hobs, gear, 67
Holders, tool, 66
Holders, work (See: Work Holders)
Holding Tools, 29, 86
Hole Location Accessories, 31
Honing Machines, 7, 145
Honing Tools, 145
Hydraulic Fluid, 35

I

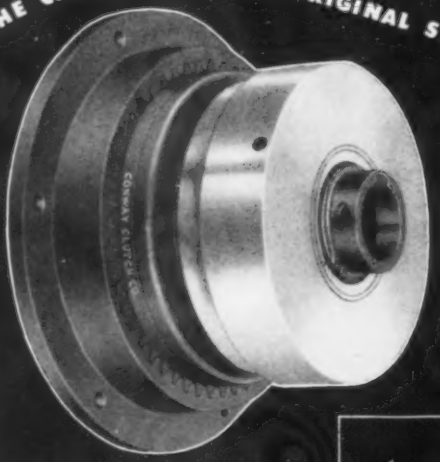
Index Centers, 259
Indexing Machines, 289
Industrial Plastics, 98
Insert Bits, 66, 225, 300
Inspection & Measuring Devices, 20, 56, 171, 185, 199, 236, 237, 242, 274, 276, 288
Inspection Units, 20, 56, 171, 185, 199, 236, 237, 242, 274, 276, 288

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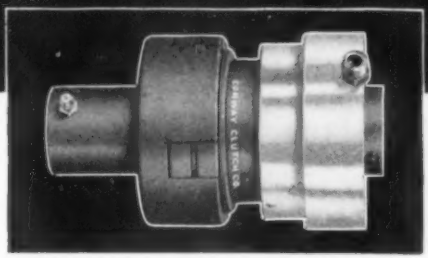


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J

Jib Boring (service) 280, 294
Jig Feet, double end & screw type, 226
  screw & press type, 226
Jig Grinders, 31, 96
Jigs & Fixtures, 41, 96, 226, 297

K

Keys, fixture, 226
  machine, 164, 290
  mill, 297
  woodruff, 164, 290
Keyseaters, 137, 280
Keyway Broaches (See: Broaches, keyway)
Keyway Cutting Equipment, 154
Knives, circular, 85
Knobs, 237
  hand, 226
Knurling Tools (See: Tools, knurling)

L

Lapping Machines, 46-47, 215
Lathe Attachments, 150
Lathes, 160a-b, 227, back cover
  automatic, 28, 83, 160a-b, 166
  bench, 2, 28, 194
  contour, duplicating, tracer-controlled, 83, 160a-b, 3d cover
  engine, toolroom, 2, 11, 28, 83, 194, 227, 3d cover
  gap, 83
  general purpose, 227
  hollow spindle, 83
  precision, 2, 11, 28, 83, 194, 227, 3d cover, back cover
  speed, 2
  turret, 2, 28, 91, 194
Layout Equipment, 237
Layout Dye, 247
Levers, 237
Lighting Equipment, 178, 253
Lubricants, 173, 180, 289, 299

M

Machine Cleaner, 75
Machine Keys, 290
Machine Racks, 164, 290
Machine Rebuilding, 48-49
Marking Devices, Stamps, 45, 192-d, 202, 230, 268, 276, 301
Marking Equipment, 45, 192-d, 230, 244, 268, 276, 302
Marking Machines, 45, 192-d, 202, 230, 244, 268
Master Pushers, 96b
Materials Handling Equipment, 237, 252, 287
Metal Forming Machines, 3, 69
Micrometers, 16-17, 274, 293
Milling Heads, 250
Milling Machine Attachments, 8-9, 250
Milling Machine Cutters, 18, 59, 140, 156, 225, 301, 302, 319
Milling Machines, 8-9, 58, 177, 250, 271
  contour, 149
  hand, 271
  horizontal, 149, 223
  hydraulic, 271
  tracer controlled, 149
  turret, 149, 223
  vertical, 149, 223
Mist Collectors, 58, 61, 233
Mist Generators, 269
Molds, lead hammer, 285
Motor Arbors, 74

N

Nameplates, 45, 202, 284
Nippers, 193
Notcher, 264
Numbering Heads, 45, 230
Numbering Machines, 202
Nut Tapping Machines, 41
Nuts, 226
  coupling, 226
  flanged, 226

O

Ovens, 128, 303

P

Panels, 284
Pantographs, 149
Parallels, 207
  box, 232
Pilots, 62
Pins, 164, 297
  taper, 164, 290
Pipe & Tube Mills, 155
Plate Saws, 191
Plates, angle, 232, 237, 276
  bench, 237
  lapping, 237
  layout, 237, 276
  steel, 98
  surface, 237, 276
Pliers, 217
Polishing Machines, 61
Polishing Tools, 40
Portable Air Tools, 40
Portable Electric Tools, 40
Porting Tools, 264
Powdered Metal, 71
Power Units, hydraulic, 128a-d
Press Brakes, 163, 192b-c
Press Feeds, dial index, 277
Press Guards, 250
Press Room Equipment, 250
Presses, 52
  air, 52, 58
  arbor, 301, 58
  automatic, 72
  deep throat, 241
  dial feed, 277
  double crank, 175
  flywheel, 175
  foot, 50, 72
  forging, 72, 182
  forming, 52, 72, 182
  gap type, 175, 298
  gear, 175
  hand, 55, 286
  horn, 298
  hydraulic, 55, 57
  knuckle-joint, 72, 182
  O.B.I., 72, 182
  power (punch), 52, 58, 72, 182, 241, 250, 277, 298
  single crank, 175
  straight side, 175, 298
  straight side double crank, 175
  turret punch, 30
Press Room Equipment, 282
Punches, 36, 62, 182, 286
Punches, & Dies, 62
Punching Equipment, 62, 182
Pushers, 96b, 251, 320
Pyrometers, 128

Q

Quills, 62

R

Racks, 265
Radius Dressers, 220
Railroad Pins & Bushings, 128a-d
Reamers, 186, 264, 302
  center, 85
Recessing Tools, 208
Reels, stock, 69
Refractories, 46-47, 192a
Riveting Hammers, 286
Riveting Machines, 213, 282, 286
Rivet Spinners, 286
Roll Feeds, 228, 282
Roll Forming Machines, 155
Rolls, 155
Router Bits, 18

S

Sanders, portable, 40
Saw Blades, 2d cover, 76, 249
  band, 2d cover, 22, 32a-b, 153, 188, 234

PRODUCTS INDEX

circular, 23, 249
cut-off, 23, 234
hack, 2d cover, 22, 32a-b, 153, 165, 188
segmental, 23
slitting, 23, 249
Sawing Machines, 2d cover, 191, 203
band, 2d cover, 58, 181, 234
circular, 76, 203, 234
cut-off (See: Cut-Off Machines)
friction, 76, 181
radial, 76
Saws, carbide tipped, 85, 249
metal cutting, 85, 249
slitting & slotting, 85, 249, 319
Saw Sharpeners, 272
Scales, 284
Screw Drivers, power, 40
Screw Machines(See: Bar Machines, automatic)
Screws, 226, 238, 261, 265
Screws, cap, set, socket and machine, 226, 238, 261, 265
Services: Boring, Grinding, Lapping, Milling, Repairing, etc., 73, 96, 184, 271, 280, 305
Shafts, 29
Shapers, 163, 187
Shavers, Gear, 67
Shear Blades, 63, 85
Shearing Machines, 163, 182, 204, 291
Shears, hand, 303
lever, 303
squaring, 58
Sheet Metal Machinery, 204
Sheets, steel, 98
Shim Stock, 246
Shims, 246
Sleeves, 225, 283
Slides, 315
Slip Spindle Assemblies, 29
Slitter Knives, 63
Slitters, 85, 155
Slotting Attachments, 8-9
Sockets, 283
Socket Screw Products, 226, 238, 261, 265
Spacers, 63
Spacing Collars, 246
Special Machinery, 96
Special Tool (See: Tools, special)
Spherical Washers, 226
Spindle Assemblies, 29
Spindle Extensions, 29
Spindle Repair Service, 73, 148, 211
Spindles, 150, 211, 315
211
boring, 128a-d, 150, 315
drilling, 315
grinding, 128a-d, 315
milling, 315
Spot-Facing Machines, 15
Spotters, 266
Spring Coilers, 3, 193
Spring Coiling Accessories, 3, 193
Stainless Steel, 68, 219
Staking Machines, 286
Stamping Machines, 69, 230
Stamps, steel, 276, 301
Staple Making Machines, 69
Steel, bars, 68, 98, 192, 219
plastic, 68, 98
tool, 68, 98, 192, 219
Steel and Steel Stock, 68, 98, 192, 219
Step Block Sets, 216
Stock Oilers, 282
Stock Reels (See: Reels, stock)
Stones, oil and sharpening, 46-47, 192a
Straight Edges, 276
Structurals, 98
Stud Setters, 82
Studs, cut threads, 226
Surface Plates (See: Plates, surface)

T

T-Nuts & Stud Sets, 226
T-Slot Nuts, 226
Tables, compound, 259
drill, 201
elevating, 259, 288
rotary, index, 31, 96, 224, 259
Tap Cartridges, 206
Tap Drivers, 85
Tap Holders, 265
Taper Pins, 164, 290
Tape, Pressure Sensitive, 46-47, 192a
Tappers, 210, 245, 265, 304
automatic reverse, 245
Tapping Attachments, 42, 198, 210, 245, 257, 265, 281
Tapping Compounds, 75
Tapping Heads, 41, 198, 210, 245, 257, 265, 281
Tapping Machines, 41, 121, 210, 265
Tapping Units 41
Taps, 16-17, 18, 34, 82, 184
spiral flute, 34
Templates, 226
Thread Comparators, 185, 199
Thread Rolling Heads, 125
Threading Machines, 41, 95
Threading Tools (See: Tools, threading)
Tool Bits (See: Bits, tool)
Tool Holders, 54, 66, 150, 229, 270
Toolmakers' Instruments, 242
Tool Sharpening Machines, 145
Tool Steel (See: Steel, tool)
Tools, carbide, 14, 59, 66, 128a, 196, 264, 307
chamfering, 307
cutting-off, blade, 14, 21, 63, 307
facing, 14, 54, 264, 307
form, circular, 64, 264, 307
hand, 242
knurling, 285
parting, 14
portable electric, 40
recessing, 264, 307
quick-change, 14
threading, 82, 215
trepanning, 246, 264
special, 164, 264, 307
Tote Pans, 280
Tracer Controlled Equipment, 160a-b
Transfer Punches, 62, 266
Transfer Screw Sets, 261
Tube Cutting Machines, 189
Tube Fabricating Machines, 155
Tubes, collet and pusher, 320
Tubing, 98
Turn Tables, 289

V

Valves, 235, 239
air, 235, 239
Vises, 207, 261, 265, 266, 290, 299, 301
air-powered,265, 266
bench and machine, 207, 261, 266, 290, 301

W

Ways, 63
Wear Strips, 63
Welding Equipment & Supplies, 89
Wheels, 237
Wire Forming Machines, 3, 69
Wire Straightening and Cutting Machines, 3, 69
Wire Strippers, 286
Work Holders, 232, 251
Wrenches, 4

PRODUCTS INDEX

Index to Advertisers

MACHINE AND TOOL blue book

A

A. K. Tool Company, Inc. 280
Aaron Machinery Company 11
Ace Drill Bushing Company 77
Ace Drill Corporation 196
Acme-Danneman Company, Inc. 294
(Danneman Die-Set Division)
Acme Tool Corporation 276
Acromark Company 202
Advance Products Corporation 224
Adjustable Clamp Company 294
Aetna Manufacturing Company 269
Aget Manufacturing Company 233
A.I.T. Diamond Tool Company 212
Alina Corporation 256
Allegheny Ludlum Steel Corporation 219
Allen Collet Manufacturing Company 320
Allison Campbell Division 1
(American Chain & Cable Company)
Allstate Diamond Products, Inc. 240
Almco Queen Products, Inc. 53
Alpha-Molykote Corporation 173
Alvin Products, Inc. 245
American Chain & Cable Company 1
(Allison Campbell Machine Division)
American Chain & Cable Company 309
(Severall Division)
American Chain & Cable Company 248
(Wilson Mechanical Instrument Division)
American LIP Corporation 52
American Machine & Foundry Company 290
American Pullmax Company, Inc. 204
American Roller Die Corpcration 155
American Tool Works
Company ..... Inside Back Cover
Amidon Engineering Company 304
Anderson Bros. Manufacturing Company 55
Applied Mechanics Corporation 251
Armstrong Blum Manufacturing
Company ..... Inside Front Cover
Armstrong Brothers Tool Company 4
Atlas Press Company 28
(Clausing Machine Division)
Aurora Equipment Company 252
(Equipto Division)
Auto Moulding & Manufacturing Company 247

B

Baker Brothers, Inc. 133
Baj Tool Company 60
Baldor Electric Company 222
Barnes Drill Company 24
Bath & Company, Inc., John 16-17
Bay Products, Inc. 287
Bay State Abrasive Products Company 26-27
Bearings, Inc. 73
Beaver Gear Works 258
Beaver Rotary File Company 273
Behr-Manning Company 192a
Bellows Company 79
Benco Collet Manufacturing Company 96b
Benchmaster Manufacturing Company 250
Blanchard Machine Company 135
Blue Valley Machine & Manufacturing
Company 291
Boggis & Company, Henry P. 274
Bokum Tool Company 54
Bremil Manufacturing Company 303
Brightboy Industrial Division 209
(Weldon Roberts Rubber Company)
Brookfield, Inc. 229
Brown & Sharpe Manufacturing Company 59
(Cutting Tool Division)
Buck Tool Company 44
Buffalo Forge Company 15
Bullard Company 48-49
Bunting Brass & Bronze Company 71
Byco Industries 303

C

Cadillac Gage Company 25
Capewell Manufacturing Company 165
Carr-Lane Manufacturing Company 297
Challenge Machinery Company 232
Chandler Tool Company 259
Chicago Manufacturing &
Distributing Company 299
Chi-Co., Inc. 286
Cincinnati Electrical Tool Company 315
Cincinnati Milling Machine Company 8-9
Cincinnati Milling Machine Company 75
(Cimcool Division)
Cincinnati Shaper Company 163
Circular Tool Company 85
Clausing Division 28
(Atlas Press Company)
Clemson Bros., Inc. 153
Cleveland Automatic Machine Company 92
Cleveland Grinding Machine Company, The 267
Cleveland Instrument Company 56
Cleveland Punch & Shear Works Company 182
Clipper Diamond Tool Company 240
Collis Company 283
Columbia Cam Company 294
Commercial Filters Corporation 205
Commander Manufacturing Company 197
Comtor Company 260
Concentric Tool Corporation 268
Conway Clutch Company 311
Cook, Inc., Lawrence H. 285
Cooley Electric Manufacturing Company 128
Covel Manufacturing Company 20
Criterion Machine Works 84
Crucible Steel Company of America 68
Cunningham Company, M. E. 276
Cushman Chuck Company 96a
Cutting Tools, Inc. 305

D

Danneman Die Set Division 294
(Acme-Danneman Company)
Davis Keyseater Company 137
(Div. Hansford Mfg. Corp.)
Dazor Manufacturing Corporation 253
Defiance Machine Tool Company 244
Denison Engineering Company 57
Detroit Die Set Corporation 10

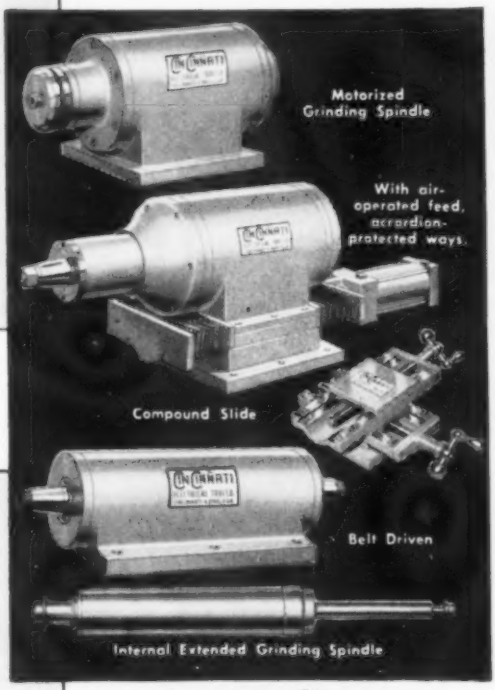
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Detroit Stamping Company 246
DeVlieg Microbore 150
(Division DeVlieg Machine Company)
Dixie Tool Industries 301
Dixon Automatic Tool, Inc. 179
Donovan Manufacturing Company 261
Dreis & Krump Manufacturing Company 262
duMont Corporation 154
Durant Tool Supply Company 282
Dykem Company 247

E

Eastern Machine Screw Corporation 275
Eclipse Counterbore Company 140
Eisler Engineering Company 289
Empire Tool Company 21
Engraved Products Company 284
Equipto Division 252
(Aurora Equipment Company)
Etco Tool & Machine Company, Inc. 198
Ex-Cell-O Corporation 128a-d

F

Famco Machine Company 58
Federal Press Company 277
Fellows Gear Shaper Company 50-51
Fiske Brothers Refining Company 180
Flynn Manufacturing Company 270
Foster Supplies Company 291
Fostoria Pressed Steel Corporation 178
Fulmer Company, C. Allen 7

G

Galland-Henning Nopak Division 239
Gallmeyer & Livingston Company 190
Gay-Lee Company 249
Geneva Drives Corp. of Florida 300
Gisholt Machine Company 166
Glover Manufacturing Company 304
Gorton Machine Company, Geo. 149
Grant Manufacturing & Machine Company 282
Graymills Corporation 280
Greaves Machine Tool Division 177
(J. A. Fay & Egan Company)
Green Instrument Company 65
Green Manufacturing Company 298
Greenerd Arbor Press Company 301

H

Hamilton Tool Company 121-123
Hammond Machinery Builders, Inc. 61
Hardinge Brothers, Inc. ..... Back Cover
Heller Tool Company 32a-b
Heiman Manufacturing Company 261
High Speed Hammer Company 286
Himoff Machine Company, Inc. 289
Homestrand, Inc. 42-227
Hones Incorporated, Charles A. 273
Houston Grinding Machine Company 272
Huppert Company, K. H. 303

I

Index Machine Company 223

J

Jacobs Manufacturing Company 12-13
Johnson Gas Appliances Company 144
Johnson Machine & Press Corporation 298
Jones & Lamson Machine Company 82-199

K

Kenco Manufacturing Company 241
Kennametal, Inc. 225
Kent-Owens Machine Company 271
Kidde Precision Tool Corporation 230-294

L

L & J Press Corporation 175
L & L Manufacturing Company 231
Landis Machine Company 95
Lapeer Manufacturing Company 217
Lassy Tool Company 304
Leland Gifford Company 317
Levin & Son, Inc., Louis 91
Lewthwaite Machine Company, T. H. 266
Lilly & Company, Eli 37-38-39
Lincoln Electric Company 89
Linley Brothers Company 285
Lodge & Shipley Company 83
Lucas & Sons, J. L. 280
Lucas Machine Division 160a-b
(New Britain Machine Company)
Lucifer Furnaces, Inc. 292

M

M. B. Products 263
MBI Export & Import Ltd. 70
McDonough Manufacturing Company 295
Machine Products Corporation 237
Machine Tool Publications 304
Magna-Lock, Incorporated 207
Manhattan Supply Company 251
Marshall Steel Company .....
Martin Machine Company, J. E. 266
Matthews & Company, Jas. H. 230
Maxwell Company 208
Mead Specialties Company 243
Metal Carbides Corporation 66
Michigan Tool Company 67
Midwest Tool & Engineering Company 288
Minster Machine Company 72
Modern Machine Tool Company 201
Montgomery & Company, Inc. 242
Moore Special Tool Company 31
Morse Twist Drill & Machine Company 18-19
Motch & Merryweather Machinery Company 23
Mummert-Dixon Company 284

N

National Acme Company 80-81-125
Neill & Company, Ltd., James 32
Neise, Karl A. 246-270-278
New Britain Machine Company 160a-b
(Lucas Machine Division)
New Britain Tool & Manufacturing Company 299
Nielsen, Inc. 283
Nilson Machine Company, A. H. 69
Noble & Westbrook Manufacturing Company 45

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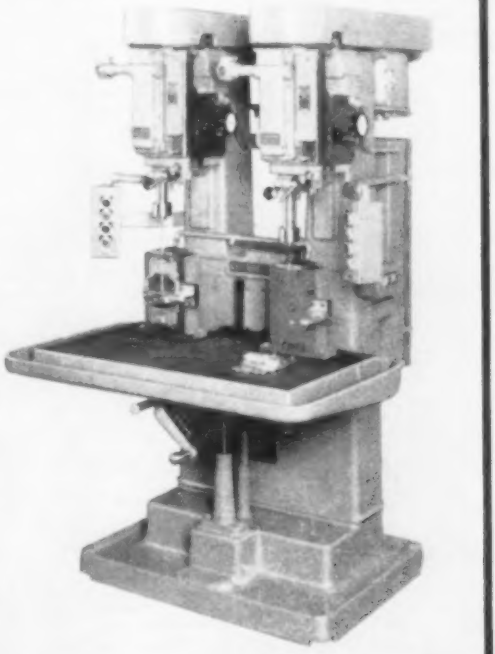
at 250 pieces per hour

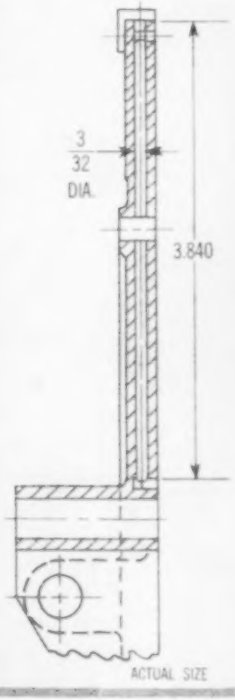
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Norma-Hoffman Bearings Corporation 139
Northwestern Tools, Inc. 226
Norton Company 46-47

O

Ohio Knife Company 63
Oliver Machinery Company 191
O'Neil-Irwin Manufacturing Company 192b-c

P

Pannier Corporation 301
Pedrick Tool & Machine Company 221
Penniman, Elisha 304-305
Perkins Machine & Gear Company 193
Picneer Tool Crib, Inc. 305
Plunket Machine Company, J. E. 301
Polyplan Company 293
Pope Machinery Corporation 211
Portage Double-Quick, Inc. 14
Pratt & Whitney Company 184-185-186-187
Precision Twist Drill & Machine Company 258
Precision Tool & Manufacturing Company 284
Preis Engraving Machine Company, H. P. 276
Procunier Safety Chuck Company 265
Putnam Tool Company 156

Q

Queen City Machine Tool Company 88

R

Reading Machine Company 280
Remington Arms Company 40
Richards Company, J. A. 278
Ring Punch & Die, Inc. 62
Rocheleau Tool & Die Company, Inc. 171
Rockwin Manufacturing Company 285
Roll Feeds Corporation 228
Rothfuss Tool Company 220
Ryerson & Son, Inc., Joseph T. 98

S

S. P. Manufacturing Corporation 235
S & S Machinery Company 33
Safety Socket Screw Company 238
Sanford Manufacturing Corporation 169
Scherr Company, Inc., Geo. 274
Scientific Lubricants, Inc. 289
Schmidt, Inc., Geo. T. 192d, 268
Scully-Jones & Company 86
Sealol Corporation 242
(Acrament Division)
Seibert & Sons, Inc. 29
Sentry Company 78
Severall Division 309
(American Chain & Cable Company)
Sheldon Machine Company 194
Shell Oil Company 35
Shwayder Company 300
Sid Tool Company 319
Snow Manufacturing Company 41
Somma Tool Company 64
Sossner Tap & Tool Corporation 34
Spellman Company, R. L. 266
Standard Horse Nail Corporation 164
Standard Steel Specialty Company 290
Stevens Company, John B. 259
Stone Machinery Company 147
Stow Manufacturing Company 255
Supreme Keyseat Cutters, Inc. 305
Syntron Company 215

T

Taft-Peirce Manufacturing Company 236-279
Tamms Industries, Inc. 247
Tannewitz Works 181
Tap-Cartridge Company 206
Tapmatic Corporation 281
Thompson & Son Company, Henry G. 188
Thompson Grinder Company 43
Thriftmaster Products Corporation 245
Tobin-Arp Manufacturing Company 145
Tomkins-Johnson Company 213
Torit Manufacturing Company 254
Torrington Manufacturing Company 3
Torsion Balance Company 296
Ty-Sa-Man Machine Company 76
Twentieth Century Manufacturing Company 302

U

United States Drill Head Company 210
Universal Metal Hose Company 303

V

Vanadium Alloys Steel Company 192
Vascoloy-Ramet Corporation 307
Vee-Arc Corporation 200
Victor Machinery Exchange, Inc. 297
Victor Saw Works 22
Vogel Tool & Die Corporation 189
Vulcan Tool Company 96

W

Wade Tool Company 2
Wallace Supplies Manufacturing Company 203
Wardwell Manufacturing Company 272
Watts Brothers Tool Works 303
Weldon-Roberts Rubber Company 209
Wells Manufacturing Corporation 234
(Brightboy Industrial Division)
Western Abrasives 305
Wetmore Tool & Engineering Company 264
Whistler & Sons, Inc., S. B. 36
Whitney Metal Tool Company 264
Whitnon Manufacturing Company 148
Wiedemann Machine Company 30
Wilson Air Collet Closer, Inc. 287
Wilson Mechanical Instrument Division 248
(American Chain & Cable Company)
Woodruff & Stokes Company 302
Woods Machine Company, S. A. 74

Y

Yost Manufacturing Company 265

Z

Zagar, Inc. 257
Zero Internal Gage Company 288

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4	5/16	1	15.05
4	7/16	1	16.55
4	9/16	1	18.90
4	11/16	1	19.90
4	13/16	1	22.95
4	15/16	1	25.25
4	1	1	28.00
4	1 - 1/8	1 - 1/4	28.35
4	1 - 1/4	1 - 1/4	31.20
5	1/4	1	19.25
5	5/16	1	19.60
5	3/8	1	21.65
5	7/16	1	23.05
5	9/16	1	25.90
5	11/16	1	28.95
5	13/16	1	31.20
5	7/8	1 - 1/4	33.55
5	15/16	1	34.65
6	1/4	1	23.75
6	5/16	1	24.30
6	3/8	1	26.05
6	7/16	1	27.85
6	9/16	1	34.30
6	11/16	1 - 1/4	36.80
6	13/16	1 - 1/4	39.35
6	7/8	1	40.30
6	15/16	1 - 1/4	42.35
8	1/4	1	52.45
8	5/16	1	54.65
8	3/3	1	56.15
8	7/16	1	59.05
8	1/2	1	60.00
8	9/16	1 - 1/4	62.30
8	5/8	1 - 1/4	63.25
8	11/16	1 - 1/4	65.30
8	13/16	1 - 1/4	66.55
8	7/8	1 - 1/4	68.40
8	15/16	1 - 1/4	70.25
10	1/4	1 - 1/2	96.65
10	5/16	1 - 1/2	97.80
10	3/8	1 - 1/2	92.15
10	1/2	1 - 1/2	101.55
10	5/8	1 - 1/2	115.90
10	3/4	1 - 1/2	133.65
10	7/8	1 - 1/2	145.15
10	1	1 - 1/2	150.35
12	1/2	1 - 1/2	169.35
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5	5/16	1 - 1/4	24.05
5	3/8	1 - 1/4	25.50
6	5/16	1 - 1/4	33.90
6	7/16	1 - 1/4	35.05
6	9/16	1 - 1/4	40.35
6	11/16	1 - 1/4	44.85
6	13/16	1 - 1/4	46.35
6	15/16	1 - 1/4	49.00
8	5/16	1 - 1/4	69.50
8	7/16	1 - 1/4	73.50
8	9/16	1 - 1/4	77.60
8	11/16	1 - 1/2	83.20
8	13/16	1 - 1/2	87.30
8	7/8	1 - 1/2	91.60
8	1	1 - 1/2	96.10
10	1/4	1 - 1/2	96.60
10	5/16	1 - 1/2	98.00
10	3/8	1 - 1/2	99.15
10	7/16	1 - 1/2	105.25
10	1/2	1 - 1/2	109.75
10	9/16	1 - 1/2	121.95
10	5/8	1 - 1/2	124.40
10	3/4	1 - 1/2	142.30
10	7/8	1 - 1/2	146.65
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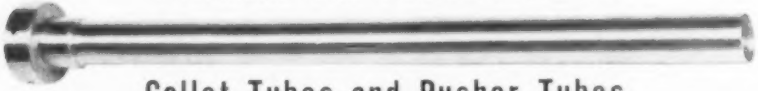
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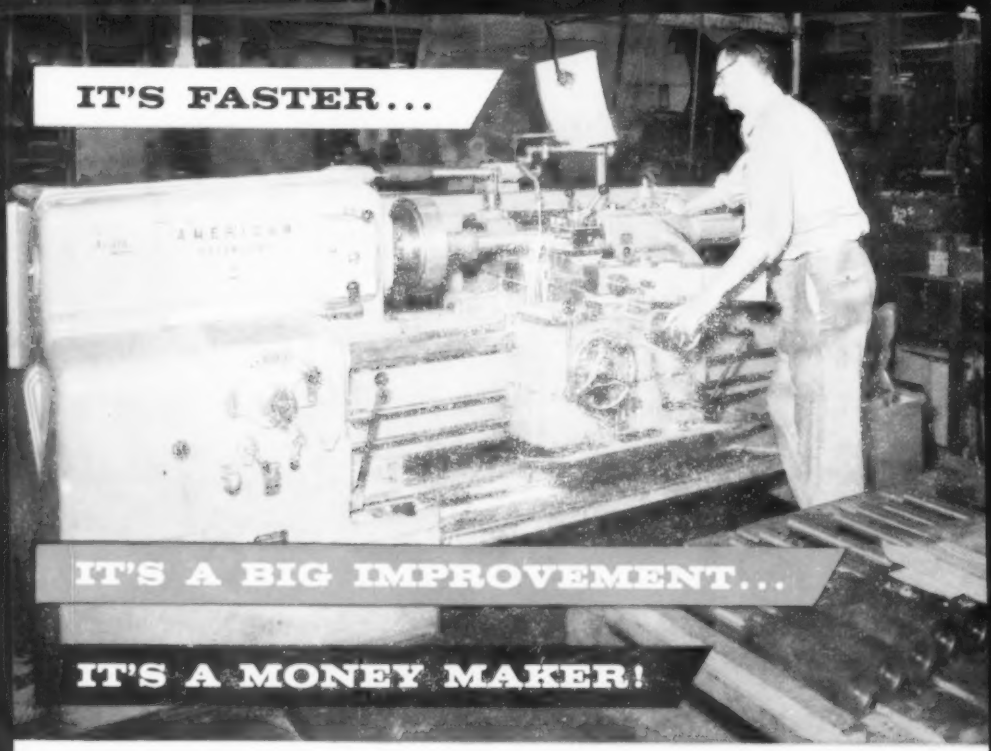


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